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MARCH 15, 1997

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Scott Heintzeman
has no reservations
about Radisson's
new system

CLIENT/SERVER
TRANSACTION
PROCESSING

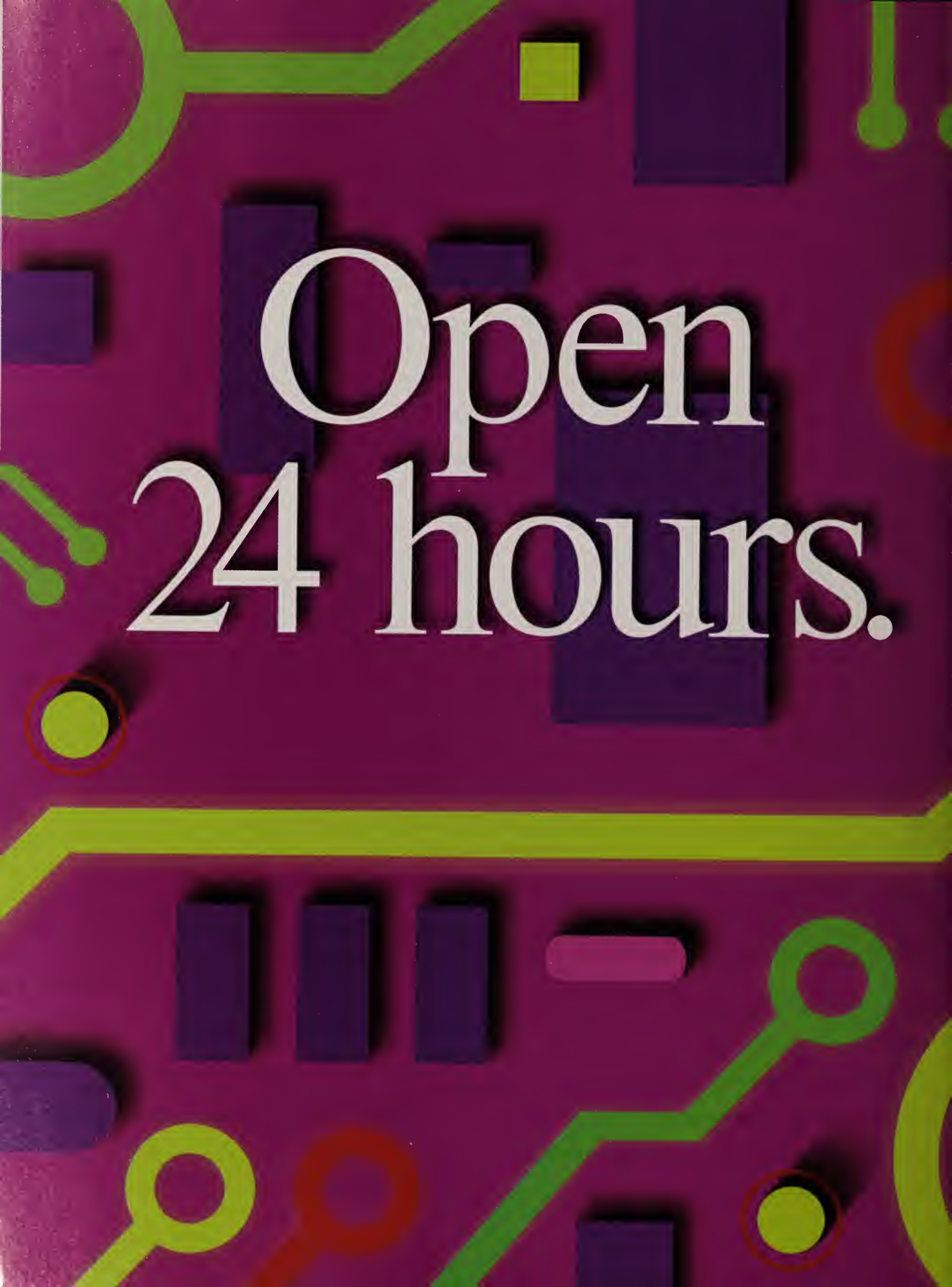
Platform Diving

PLUS
Become
A Data
Modeling
Master

PAGE 56

Are CIOs who take
the plunge getting
in over their heads?

PAGE 44



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VOLUME 10 • NUMBER 11 • MARCH 15, 1997



44 *Scott Heintzeman dipped into client/server with Radisson's reservation system.
Cover photo by Steve Woit*



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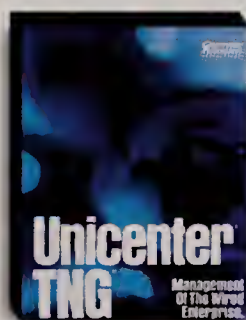
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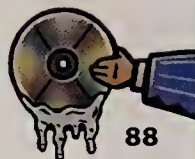
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LOOKING BACK

The CIO Archive Search our collection of CIO feature articles dating back to September 1994.

www.cio.com/CIO/ciofeaturearchive.html

A QUORUM OF FORUMS

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In Box

LETTER FROM THE EDITOR, READER FEEDBACK AND HOW TO REACH US

"[Today's MBAs], armed with their laptops and their Netscape browsers, think they know everything [about technology]. They don't know squat zero about how to construct bullet-proof software systems."

—F. Warren McFarlan, professor, Harvard Business School



I'm somewhere over the dusty, wrinkled hills of Arizona, on my way back from this year's Enterprise Value Retreat. If you've never been to one of those events, you're really missing out. (Maybe I shouldn't say that, since my own company organizes the conferences, but it's true.)

I had a blast. Three days with hundreds of smart and accomplished IT executives in a most congenial setting, instruction from Harvard Business School legend Warren McFarlan and 70-degree weather on the California coast in February. Not too shabby.

One reason I love listening to McFarlan is that he so clearly understands business issues from a business person's point of view. He isn't taken with technology for technology's sake, no matter how hot it might be. But because he understands IT and what it can do, he can offer perspectives from both sides. He's like a CEO and a CIO rolled into one. I suspect that's why he sits on the boards of so many major corporations.

McFarlan understands clearly and profoundly just how tightly linked business and technology strategy have become. For most companies, the days when you could develop a business plan and then decide how IT could be used to support it are gone forever. "The alignment approach is totally outmoded today," he says. "Planning activities for your business strategy and information technology have to be absolutely intertwined."

Most CEOs don't get that (see "The CEO Agenda," Page 36). In the quote above, McFarlan refers to the risk of business people thinking they understand technology simply because they now use it. Combine that misconception with a continuing lack of faith in their chief information officers and you end up with some influential people who feel equipped to make decisions about infrastructure and critical applications when they don't know "squat zero." Just as dangerous for the long haul, you end up with strategic plans that leave out some pretty important stuff.

Clearly, it behooves CEOs to learn more. In the meantime, IT executives must work harder than ever on their relationships with senior management.

Alki Lundberg
lundberg@cio.com

FROM OUR READERS

FOLLOW THE LEADERSHIP

[In response to your Dec. 1, 1996, editor's letter,] the CIO ground is beginning to stabilize because of the success of those who entered an immature market and developed IT accountability for spending, service, value and direction. There were some who could be viewed as unsuccessful. However, from the mistakes they made in the immature market, we learned and improved, so this must be considered a success.

Good IT leadership can bring tremendous value to an organization. It is a tough job, and not everyone is equipped with the vision, change management skills, organizational restructuring and business mind-set that are required. CIOs must be three to five years ahead of the organization in an industry that has the potential to change daily. They must evaluate technology that is immature and determine if it will mature to a point of being valuable to the organization.

The CIO must understand the busi-

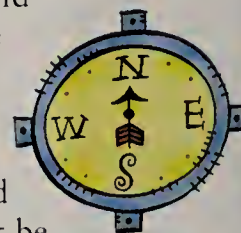


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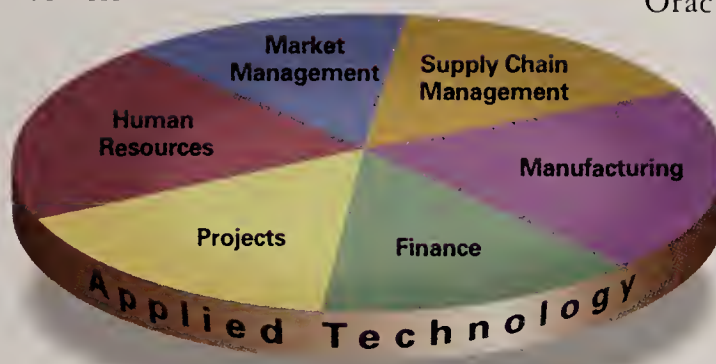
Alex Gray, Vice President of Corporate Operations

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ness and strategies of the organization and see how current and future technologies can support these processes or how the processes can be changed to effectively utilize the technologies. All this with a focus on organizational value. The CIO must envision a layer not seen by others and then bring the vision to a layer that is realistic and attainable in time to gain business advantage. The CIO must help the organization change in areas it is reluctant to change in order to remain competitive. Those changes are brought about by the adoption of technologies that bring value to the organization.

The CIO must be a strong leader in order to stand firm and lead the organization to the future, and at the same time be sensitive to adjusting his or her own vision to reality. And finally, the CIO must be secure enough to accept feedback (positive and negative) and adjust accordingly.

The CIO position is tough and not for everyone, but it is critical to the success of an organization. In the future, I believe we will see a stronger focus at the CIO level. Namely, the CEO, COO and CIO will be working as a tighter team. I'm with you—the CIO's role will certainly not be diminished.

Barrett Hand

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NEXT STOP: LETTERMAN

Thank you for your insightful "top 10" list [In Box, Jan. 15, 1997]. I felt compelled to share a top 10 list that we came up with to help promote our Network Cost Management services. It was spooky how closely several of your priorities matched ours.

Top 10 List for Successful Network Cost Management in 1997

1. AUDIT your current network infrastructure to determine your true total cost of ownership.
2. MAKE it your mission to understand your network's hidden costs, including management overhead, network downtime and trouble-shooting.
3. CALCULATE how much revenue you could add to the company if network downtime were minimized. Those figures

can be used to justify the cost of systems or services that keep your network running and your headaches at a minimum.

4. RESOLVE to purchase a new desktop system based upon its total cost of ownership and not its price tag.

5. PRIORITIZE I.S. projects by computing each project's ability to reduce operating costs, add revenue and/or increase company profits.



6. BUDGET for network security systems by first computing the value of your company data and then computing possible revenue lost to theft or destruction.

7. MEASURE your competitiveness by determining your company's Information Productivity Index rating and comparing it with your competition's.

8. REQUEST that network integrators submit a return-on-investment analysis customized to your company before outsourcing new IS projects or services.

9. DEVELOP biannual audits that show exactly how each network technology under your wing affects the company's bottom line.

10. ALWAYS REMEMBER that measuring network costs isn't everything...but it's the only key performance issue your peers can relate to!

Kahlu Miah

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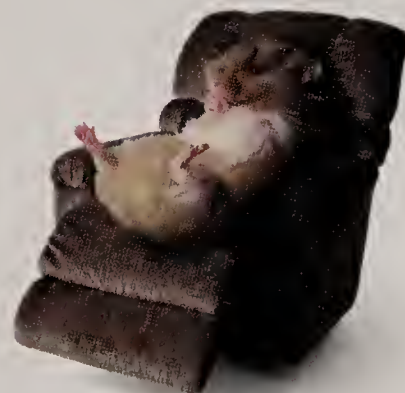
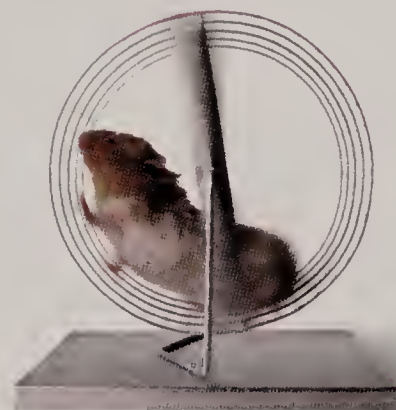
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EXT 24

this works for everybody.

Publisher's Note

"You ought to recognize people for teamwork so that they know we value it but not give them something that's extremely large, because teamwork is a basic expectation."

*—Jim Venglarik
Vice President, Systems Development
AT&T Universal Card Services Corp.*

Teamwork is something we become familiar with at an early age. Whether it's playing baseball on a Little League team or teaming up with siblings to create a coverup story to tell our parents, we learn early on about the benefits and downfalls of working with and depending on others.



Today, teamwork is increasingly important in achieving enterprisewide corporate objectives. Unfortunately, many information technology professionals are neither familiar with nor adept at producing team-driven results. In fact, Donald D. Tippet, a professor at the University of Alabama in Huntsville who has conducted extensive studies of corporate teamwork, says IS is often the worst department at

managing and rewarding teams. It is imperative that CIOs turn this situation around and transform their reluctant, individualistic IS crews into motivated, productive "team players."

How can you motivate your teams to work effectively? In "Team Payers," on Page 68, Staff Writer Derek Slater looks at incentives and team-based reward systems. In particular, he describes the pay-for-performance model, which makes a percentage of each team member's salary contingent on whether or not the team's goals are met and thus creates an "everybody wins" or "everybody loses" situation. Could such a model work at your company? Explore the pros and cons of various reward systems in this article.

P.S. Please be sure to join us May 18-21 at the next WebMaster Perspectives conference, "A Tale of Two Webs: Making Your Intranet and the Internet Pay Off," in Miami. For more information, visit our Web site at www.cio.com or call us at 800 355-0246.

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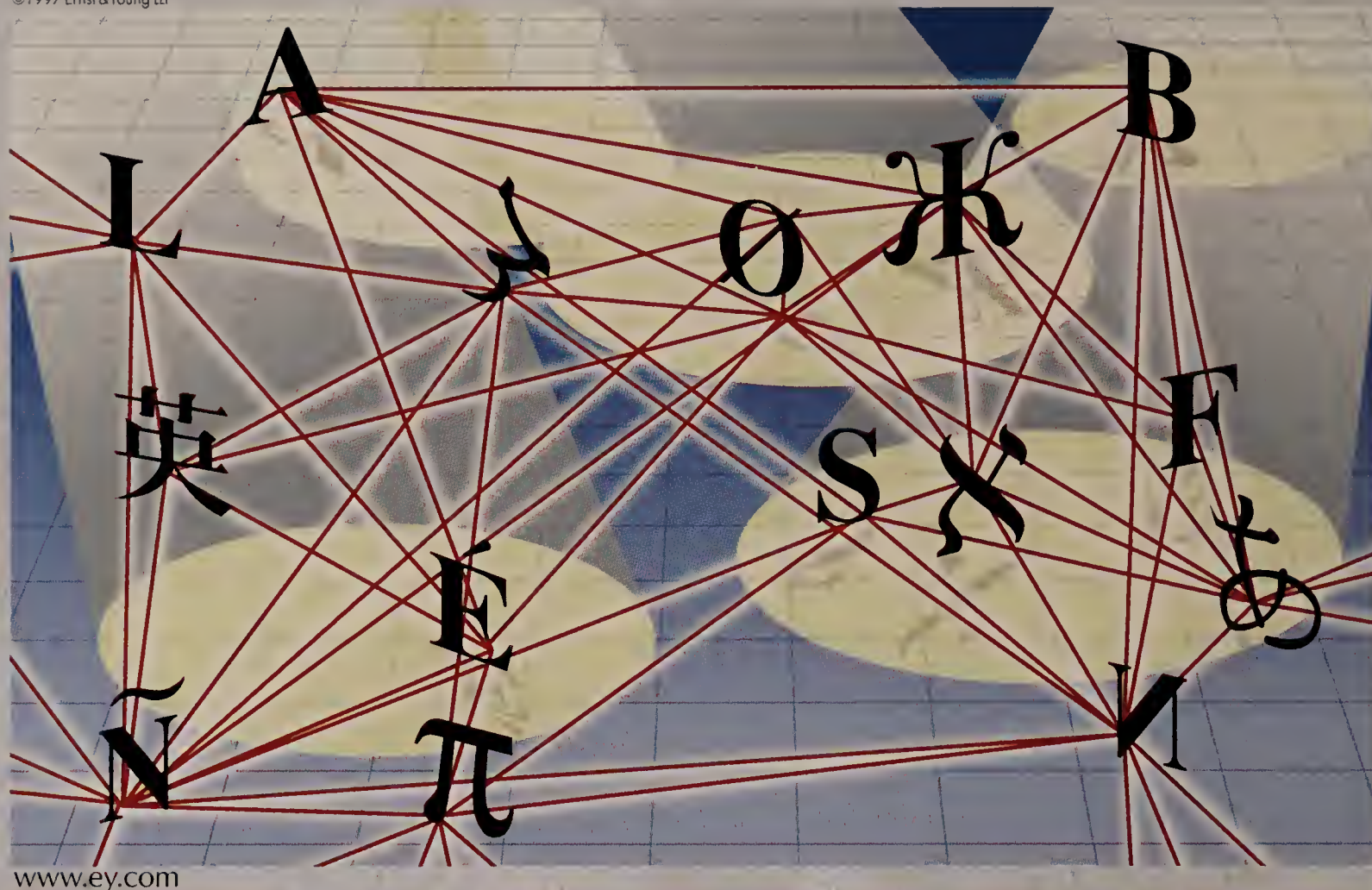
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Trendlines

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Manners of Speaking

GENTLE SURFERS Miss Manners is officially extending her purview in the etiquette biz to include netiquette as well. In her latest book, *Miss Manners' Basic Training: Communication* (Crown Publishers Inc., 1997), Judith Martin issues her arch, polite reprimands to readers, callers, pagers and surfers who, out of either naiveté or oafishness, use fax machines, beepers, e-mail and computers rudely. As Miss Manners notes, the digital world is perhaps more in need than the real one of politeness police. "Cyberspace is, in a way, etiquette in its purest form," she writes. "No one can guess how old or rich or good-looking or stylish anyone is; people can be judged only by the way they represent themselves."

The book yields some unsurprising takes on electronic etiquette. For example, Miss Manners chides those who use computers to generate "personalized" form letters, bosses who send compliments only in e-mail and usenet surfers who attack people instead of postings.



But this paragon of propriety is remarkably hip as well. She decries "emoticons" (the little symbols people put in e-mail to

indicate the mood of the sender) as inappropriate for office correspondence and passé besides. "Miss Manners dearly hopes that the smiley face is

headed for well-deserved retirement," she writes.

She also provides a chart of the acceptable media for delivering specific messages. While a congratulatory note can be sent via e-mail without offense, thank-you notes should always be handwritten. And to the reader who wonders whether writing love letters on a computer to compensate for poor handwriting is appropriate, she responds as follows:

"Really good love letters are meant to be pressed to the

Help on the Swing Shift

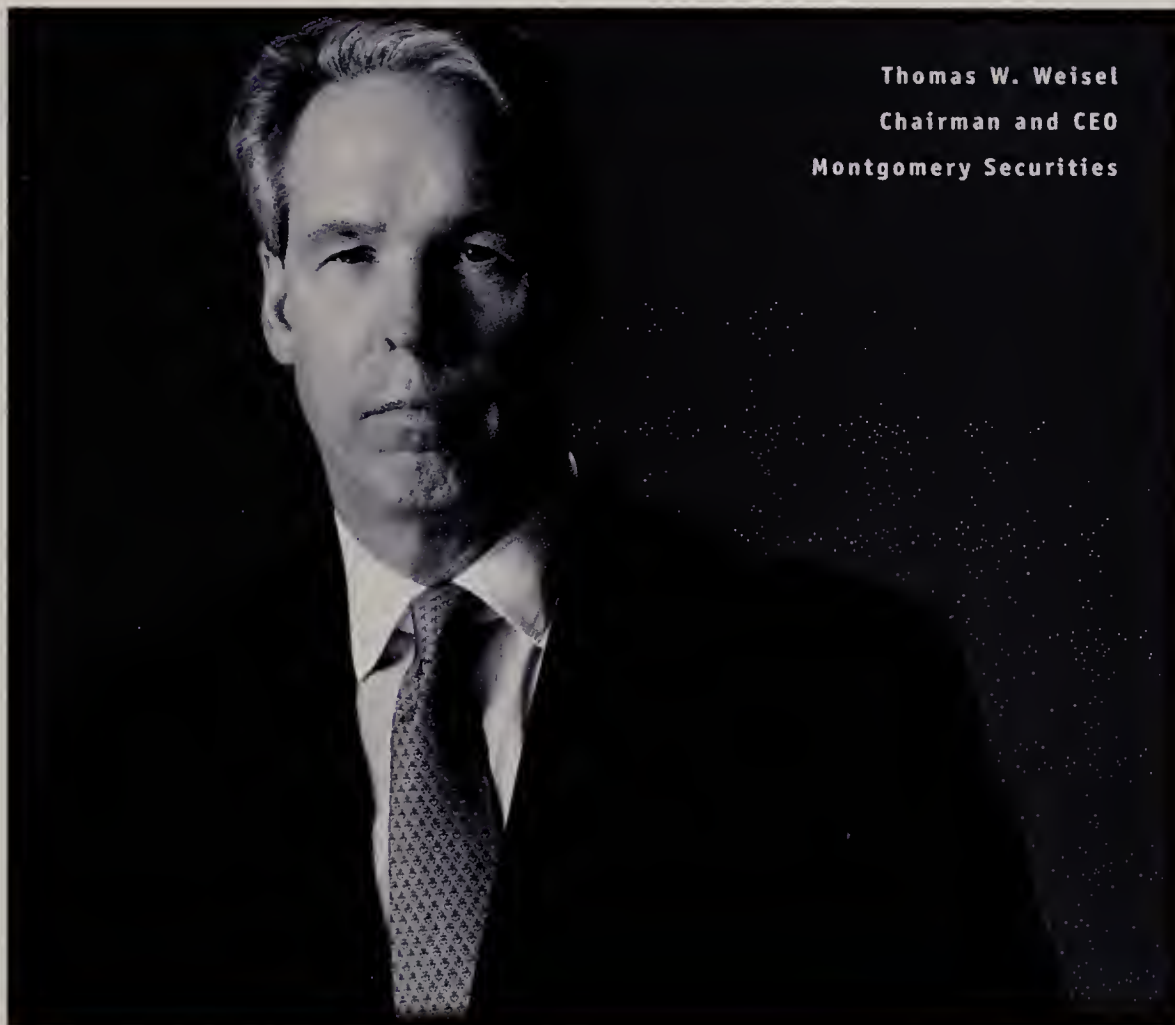
RECREATION Face it, figuring out your golf handicap can sometimes be only slightly less complex than managing an enterprisewide SAP implementation. If calculating and maintaining your handicap usually isn't atop your "to do" list, then a new Web site called GolfCap.com from The National Golf Handicap Association (NGHA) is aimed at you. The Web subscription service, which costs \$18 a year, allows golfers to track their golf scores, keep personal statistics and maintain a legitimate handicap. It won't, however, fix your slice or hook.

You can track key golf statistics, such as greens hit in regulation, percentage of shots in the fairway and number of putts taken per round. Data from your last 50 rounds of golf are accessible, and your NGHA handicap is calculated after every round.

Using the NGHA system, user groups can also start their own NGHA certified virtual golf club for casual competition, small club and league-play tournaments. You can visit GolfCap.com for a free demo and more information. ■



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Trendlines

heart and kissed, after which they become illegible anyway. Miss Manners isn't sure that they are not better off being indecipherable during and after the romance. But surely you are in a better position than she to know whether this gentleman's heart would become more inflamed by exposure to your clarity or to his imagination."

—Cheryl Dable

Feeling Lap Happy

PORTABLE COMPUTERS Think of it as leash for your laptop. The Legtop Podeum (sic) from Rach Inc. is an attempt to keep your laptop from sliding off your lap and smashing into 6 zillion bits and bytes.

The device has foam padding that attaches to the notebook and Velcro straps that go around your legs. *Verry chic.*



Sure, it's a bad idea to balance a \$5,000 piece of computer equipment that contains your most critical business documents across your knees. But the big question is whether execs will put up with the hoots and jibes from their laptop-toting peers. After all, nothing brands you as a geek quite like strapping a piece of computer equipment to your body.

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For more information call 800 942-4902 or visit www.podeum.com. ■

Findings Knowledge Networks

Knowing Enough to Share

At least some grown-up executives remember this timeless lesson from their sandbox days: Sharing is a good thing. Only these days they're applying that philosophy to information, not the Tonka Super-Duper Dumper Truck. What's more, business and technology executives see their companies doing much more information sharing through knowledge networks in the future, according to a survey of 150 North American business leaders conducted by Deloitte & Touche LLP. Fifty-two percent of the respondents say such networks are a crucial application of IT at their companies for the near term, and 63 percent say knowledge nets "will dominate their corporate technology environment" after the turn of the century.

The survey's respondents included CEOs, vice presidents and directors, all from Fortune 1000 companies. "Management has realized that there are a lot of things going on that require more team orientation instead of hierarchical orientation, more virtual groups working together—there's a long list of those trends," says Dennis Fennessey, New York-based national director for client service technology at Deloitte & Touche. Knowledge networks can play a pivotal role in supporting such working groups.

The growing interest in knowledge nets dovetails with respondents' conviction that IT can serve strategic purposes within the corporation. Eighty-three percent of them view IT expenses as a strategic investment; only 15 percent say IT is a cost that has to be managed. (Though Fennessey admits that self-promotion probably affects those numbers, since an unspecified percentage of the respondents were CIOs.) Although greater emphasis on strategy means more influence for the CIO, it also means more work. Existing IT infrastructures must undergo radical changes to achieve the desired strategic usefulness, according to many respondents.

Some of the survey's other interesting findings deal with how these senior executives say their companies are using IT. About three quarters say its primary function is as a transaction tool. Forty-one percent use IT for improving service quality, and 24 percent use it for improving product quality. Thirty-nine percent say they use IT to achieve strategic objectives such as cost-cutting. A third of the respondents say their companies include IT as part of a product or service they provide to their customers.

For a complete copy of the Survey of American Business Leaders, contact Deloitte & Touche at 203 761-3583.

—Derek Slater



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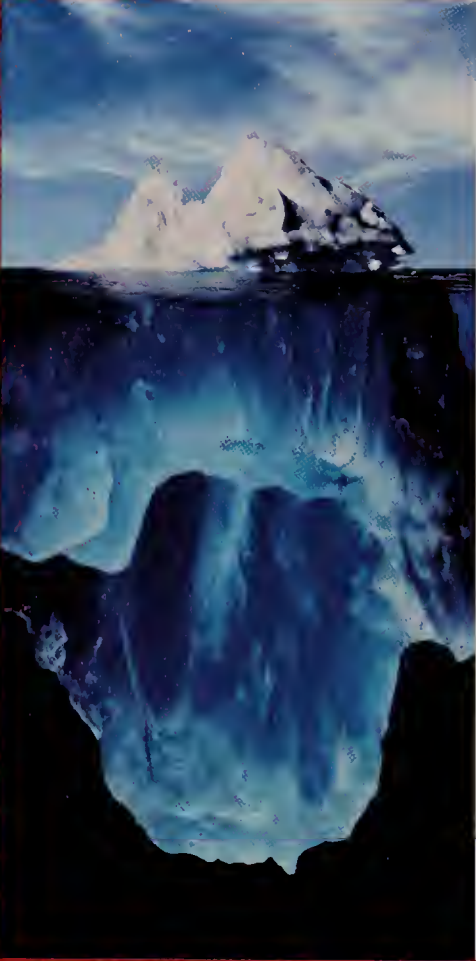
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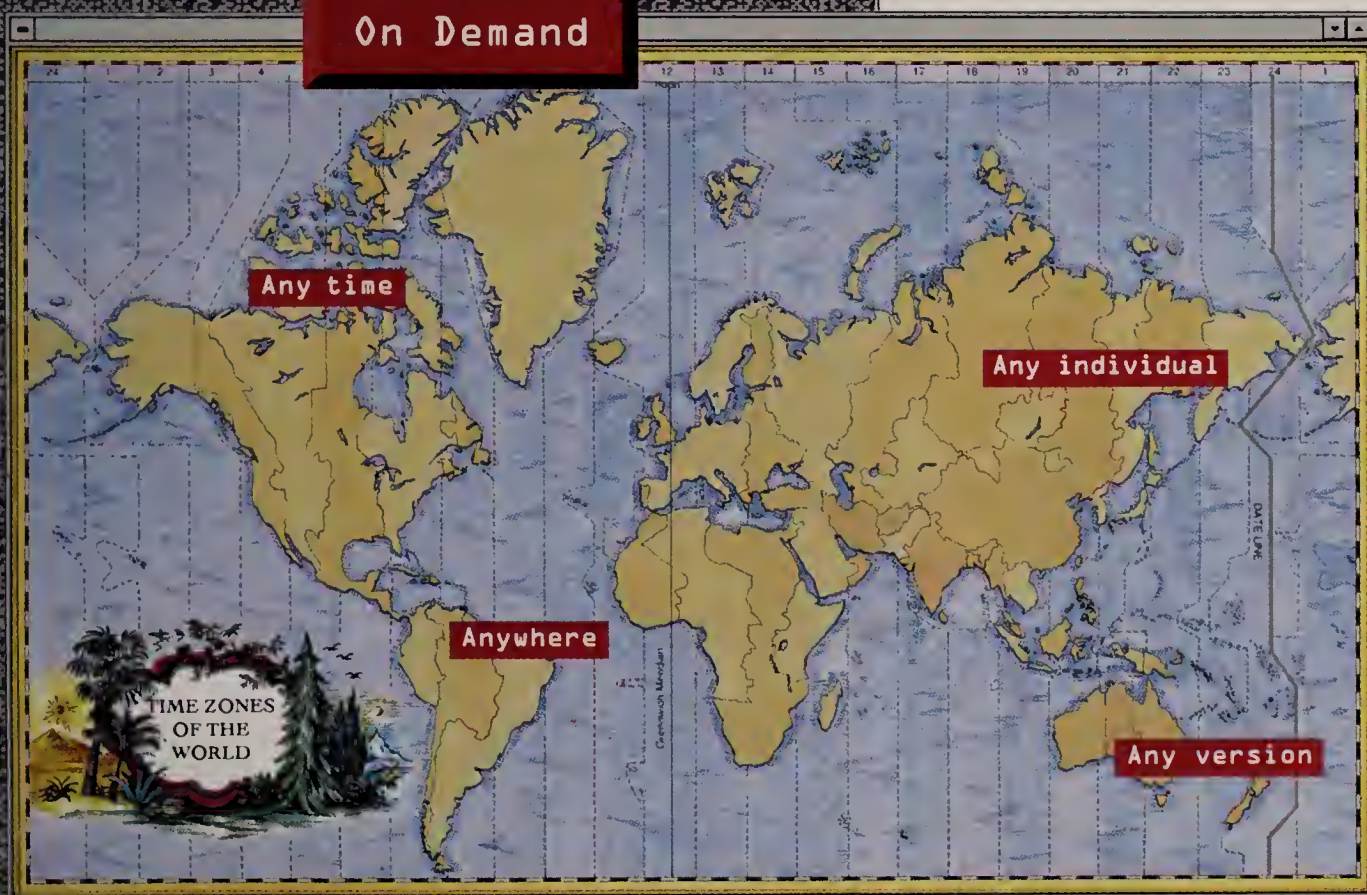


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Trendlines

Playing Fetch

WEB TOOLS Despite the Web's convenience and wealth of information resources, surfing it can be a mighty frustrating experience at times. Ever want to check your stock portfolio on a day when economic indicators come out? Trying to catch that high-flyer you own and sell it when your profits have doubled might require logging on every half-hour to check the price. And if the price doesn't change in your favor, you've just wasted a lot of time. Wouldn't it be easier if the information you needed just came to you?

Information and news have been pushed on consumers for a while with the help of services from the likes of PointCast Inc. and Individual Inc. Now, a few companies are applying that push model to Web page content by offering products that monitor and filter content, and notify users when that content changes. Making the Web's vast information resources more personal is the fundamental idea behind such services.

Caravelle Inc. (www.caravelle.com), based in Nepean, Ontario, has a product called iWatcher that's designed to tip off users when there's been a significant change to Web material the user wants to track. The product can monitor any HTML content source, so it can even check for changes in PointCast updates. With iWatcher, users can specify the changes that are important to them, whether it's a stock price percentage or a date of transaction.

TIBCO Inc. (www.tibco.com) in Palo Alto, Calif.,



offers a series of products that let users specify which Web-based information they want to look at and will deliver it to the desktop when it becomes available.

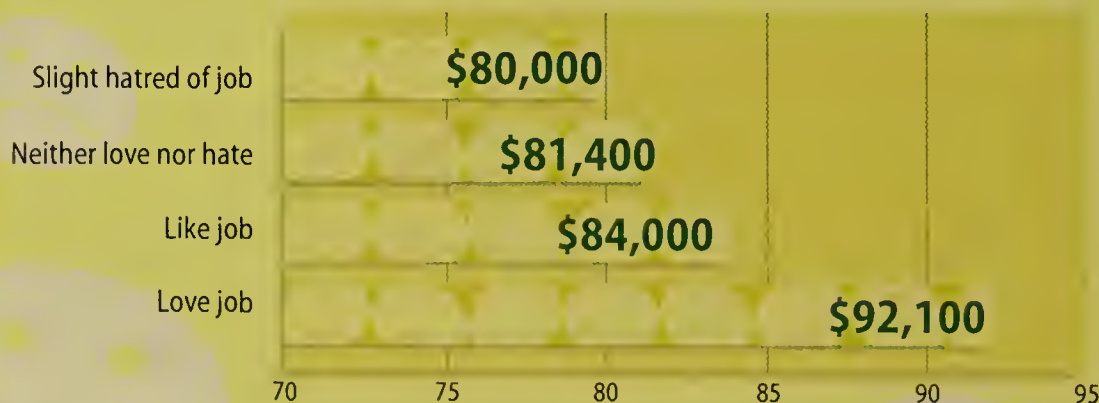
Another take on the personalization trend comes from BroadVision Inc., of Los Altos, Calif., which has introduced The Angle, (www.theangle.com) a Web-based personal information service. Editors at BroadVision review the content of Web sites and include only those that meet editors' specifications. Users then log on and create their own angle on the information by selecting graphics, choosing an editor to recommend sites and picking the preferred tone or style of information. The Angle is powered by BroadVision's One-to-One software that runs on all Sun servers running Solaris. "Users are not simply filling out forms, they are

creating their own environments on the Web," says Pehong Chen, BroadVision's CEO.

—Megan Santosus

Finding Job Satisfaction

Surprise! The more IS executives are paid, the more satisfied they are with their jobs. Perhaps one reason for the correlation (other than that money equals happiness, of course) is that higher salaries reflect a company's recognition of a position's strategic value.



Figures are for 1996 base salaries in thousands of dollars per year.

SOURCE: WEIR ASSOCIATES/G2 RESEARCH, 1996

MORE THAN HALF of the world's largest companies have been victims of fraud associated with major application launches in the past year, with **25 percent** of them losing **\$1 million** or more in the last five years.

SOURCE: DELOITTE & TOUCHE LLP



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Trendlines

The Price of Popularity

CAREER OUTLOOK Just when you think it's safe to get final sign-off from HR and start recruiting for that critical opening in your department, the pesky supply-and-demand curve starts messing with your head.

Several of the people you're looking to hire might be sought-after and expensive commodities this year, according to a study by Cleveland-based Christian & Timbers Inc., an executive recruiting firm. Its research, based on thousands of interviews with executives and surveys of employment advertising last year, puts a number of IT-related jobs at the top of the hot list for 1997. The de-

mand for Internet software developers increased almost 200 percent last year; for Internet executives it increased almost 100 percent. IT consultants found themselves an additional 68 percent more desirable last year as well.

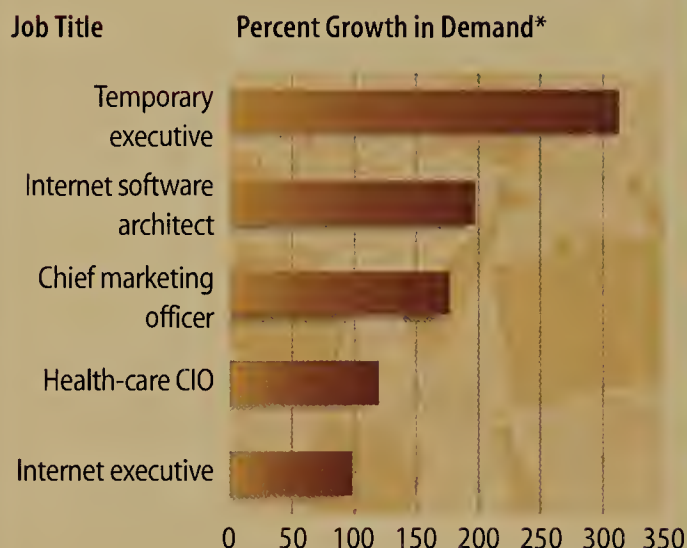
Although this upswing in the popularity of some of the positions CIOs recruit for reflects an increased business need for certain skills, the best plan may be to wait out the inflated market, says Steve Mader, managing director for the Boston office of Christian & Timbers.

"I've heard examples in some companies of salaries [for Java programmers] exceeding \$150,000," Mader says. "The fear factor is high. People are afraid of information that they don't understand, and they are afraid to get left behind."

Other hot jobs include vice president for the year 2000 problem. (Of course, if you haven't hired one already, it might be too late to bother.)

On the bright side, CIOs in health care can look forward to being hot items themselves. Mader says that because the health-care industry typically has underinvested in technology, it is due for a boom in strategic spending in IT—starting with hiring more CIOs.

Hot Jobs



*between Jan. 1, 1996 and Nov. 30, 1996

SOURCE: CHRISTIAN & TIMBERS INC.



Name Game

If you've got a new company or product to name, you might have to head back to the drawing board if your favorite moniker is some variation on Web-o-rama Development or Cybercool Associates. The word "Web" is already included in more than 1,000 active U.S. trademarks, up from 29 in 1994. "Cyber" is used in 105 active trademarks, compared with 32 in 1994. Overall, there are more than 173,000 active computer or technology trademarks, making it the largest trademark category. Good luck.

SOURCE: LEXICON BRANDING INC., A SAUSALITO, CALIF.-BASED NAME-CONSULTING FIRM

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You're traveling and your laptop battery goes dead, which is what you'll be if you can't use your computer on the six-hour flight to your next meeting. One phone call to the folks at 1-800-BATTERIES and your battery will be delivered the next day. Check out www.powerexpress.com to see their catalog of 6,000 batteries and mobile tools. ■

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Change Agent *By Carol Hildebrand*

TRANSFORMING PEOPLE, PROCESSES AND ATTITUDES

Inside and Out

It's temptingly easy to manage change by honing internal processes, but leading change requires looking beyond the organization's walls to rich, new opportunities

JUST GOT BACK FROM a gaggle of conferences on change and knowledge, and to be quite honest, the experience left me downright cranky.

Now, this is not the way it usually works. If I get to leave the sleety Northeast for a resort in a more salubrious climate, listen to stories from actual practitioners and pick the brains of learned types, I usually end up with a hat full of ideas. This time, however, the case studies and pundits left me with a low-grade case of conceptual malaise. I just wasn't inspired.

But it wasn't until Peter F. Drucker spoke about change management at the last conference that I pinpointed the source of my discontent.

Listening to Drucker is always a protracted and vigorous mental exercise, and this time was no exception. He started on the topic of managing in times of change and then wandered off on a seemingly random series of topics—but woe to those who tuned out and started making “to do” lists. Drucker eventually circled neatly back to his original point. Having touched

on a number of social, political and economic trends that will force businesses to develop new revenue streams and corporate cultures in order to survive, Drucker chided his audience for thinking of change in terms of internal cost and cycle time reductions rather than as a force that can generate new revenue for the business. He urged

attendees to quit navel-gazing and start focusing on those external factors.

His warning stood in marked contrast to many of the conference case studies, which were meant to showcase user projects that changed the way a corporation did business. Instead, many of the user stories reminded me

of a shell game played with business processes:

The business users dexterously shuffle the order of processes and sometimes even add or subtract one, but in the end, they still finish with the same indistinguishable shells in a row hiding the same little pea.

Maybe some savings are realized, but essentially users still do what they always did to make products or supply services. Worse, their exclusive internal focus serves as a poor plan for dealing with external forces of change.

“On the inside, there are only costs,” Drucker warned. “It’s my job to remind you: Business results are only on the outside of a company, and the outside in the next few years is going to look quite different.”

Futurist Stan Davis echoes Drucker when he divides an enterprise into the organization and the business. In his lexicon, the organization is the series of procedures, functions and policies that govern how a product or service is created and delivered. The business is the company’s actual service or product, the reason a particular assortment of



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Photo Credit: Scala/Art Resource, NY. Michelangelo Buonarroti. The Creation of Adam: detail of the hands of God and Adam. Sistine Chapel, Vatican Palace, Vatican State.

Change Agent

people collect a paycheck from the same employer. "The business should always come first," Davis says, "and the organization should follow." Davis says many companies spend too much time tinkering with their internal workings—a dangerous pastime in this turbulent business world. They run the risk of producing the procedural equivalent of the

perfect buggy whip just as the first fleet of Ford autos rolls off the assembly line. In Davis's view, if you want to improve the organization of your company, don't fine-tune the one you have. Instead, create a new business, and an organization that services those changing business conditions will grow in response. After all, he says, "a business should not exist to run an organization—that's a bureaucracy" (And we all know how fast bureaucracies respond to change.)

For many corporations, that is a heck of a note. Any right-thinking business has customers who already want the product the company sells, and its employees have their hands full with the jobs they already have. Who has time to go out and create new businesses? I know that if my editor stomped into my office one fine day and said, "Well, Carol, in addition to writing that

feature, I'd like you to rustle us up a new magazine," I'd feel just a tad stressed.

So here's the thing. I submit that responding to external forces of change is too important for employees do only during off hours. Maybe what's confusing here is that corporations usually talk about managing change when they should be thinking about leading change. Consider the two words: "Managing" suggests implementing the status quo, making sure that processes run smoothly; "leading," on the other hand, is all about vision. A company that's really serious about transformation needs a person, not a revamped process. A person with a very clear view of how a change will yield new revenue, a person who can focus herself and her coworkers on making that concept work. In other words, a leader.

Listen to Warren Bennis, a business professor and the founding chairman of The Leadership Institute at the University of Southern California and a guy who's been dissecting the inner workings of

“It's my job to remind you: Business results are only on the outside of a company.”

—Peter Drucker

Great moments in corporate



THE WHIP, 3000 B.C.

An effective communication device first used in ancient Egypt, noted for its impact and immediacy.

Issues of corporate culture, however, were in sharp debate.



THE MEGAPHONE, 1832

During the Industrial Revolution, communicating to a large group of workers simultaneously was of utmost importance. Attention-getting medium, but lacked wide distribution.



THE OFFICE MEMO, 1923

The invention of the mimeograph paved the way for the interoffice memo. Distribution was compromised by the medium's considerable lack of speed.



E-MAIL, 1983

Technology seizes the day! Distribution and speed empowered corporate America. However, prioritization concerns were raised as important messages were buried.

leadership for 15 years. "Leaders are people who do the right things. Managers are people who do things right. There's a profound difference," he says. "When you think about doing the right things, your mind immediately goes toward

The need for leadership can go against the organizational principles of many corporations today, says Bennis. Leadership skills, he says, involve enlisting employee support for a vision, inspiring trust and hope in the work force, encouraging can-

sor and director of the Information Management Program at the University of Texas at Austin. "When you start talking about organizational behavior, they react with, 'This is slop. What's the bottom line?'" Certainly hard skills are vital

"Managing" suggests implementing the status quo, making sure that processes run smoothly; "leading," on the other hand, is all about vision.

thinking about the future, thinking about dreams, missions, visions, strategic intent, purpose. But when you think about doing things right, you think about control mechanisms. You think about how-to. Leaders ask the what and why question, not the how question. Leaders think about empowerment, not control."

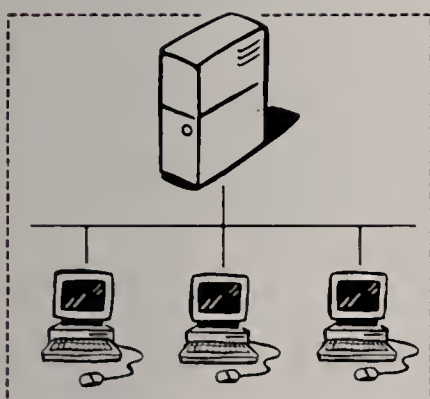
dor from employees and regarding mistakes as learning tools, not punishable offenses. That attitude is not part of most executives' skill set.

Think about it. Business schools emphasize financial management, not leadership. "MBAs want the hard skills," says Thomas H. Davenport, a profes-

to the well-being of a company, but their preponderance may lie behind the inability of some companies to react quickly to change. Too much management, not enough leadership. **CIO**

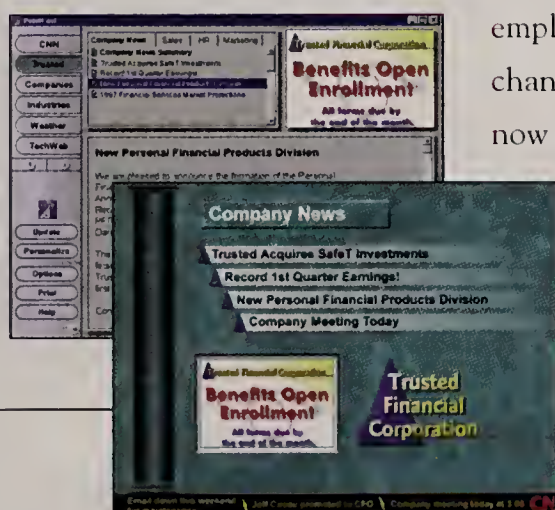
Senior Editor Carol Hildebrand can be reached at cjh@cio.com.

[communication] history.



THE INTRANET, 1994

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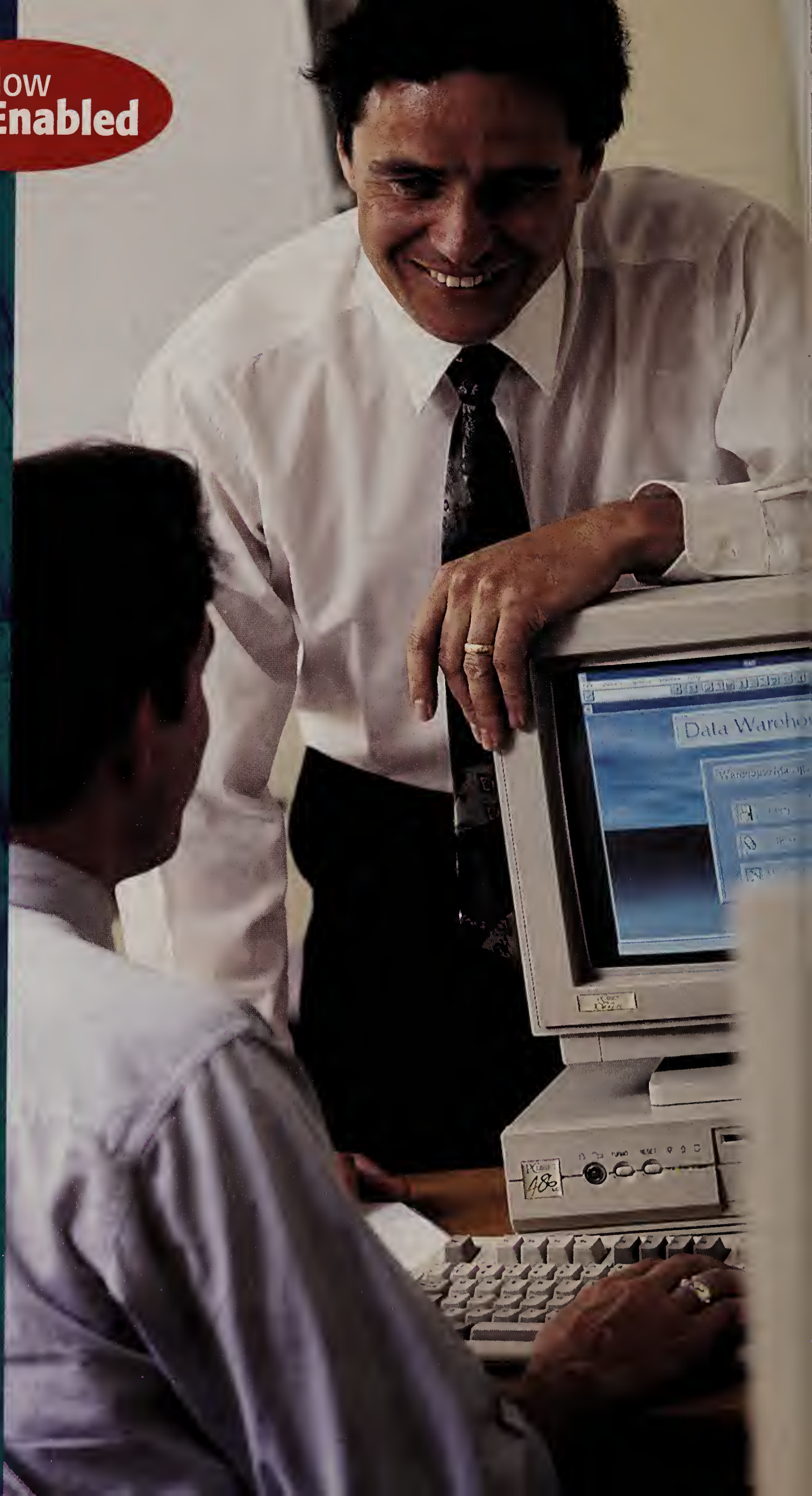
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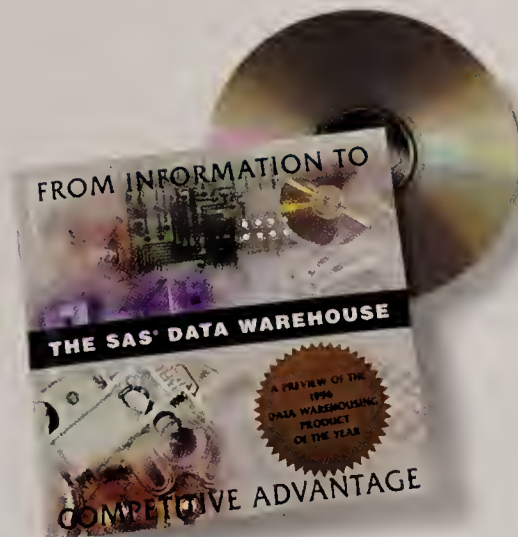
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Processing Process Information

Know much about how your company gets work done?

THE BLOOM MAY BE OFF THE reengineering rose, but most managers realize that the need to identify, improve and manage business processes did not vanish when reengineering books dropped off the bestseller list. As one of the 87 or so authors of books on that topic, I hear a lot of criticism of the reengineering concept but very little negative feedback on its emphasis on business processes. Processes are how we do our work—or at least how we would like to do our work. They are at the heart of not only reengineering but also total quality, “the horizontal organization” and countless other buzzword-labeled attempts to increase productivity and to do work better.

The importance of processes is widely known, but a relatively undiscovered concept is that gathering better information about processes is a good way to make processes better. By “information,” I mean the full range of stuff that term includes—from data to knowledge. If you’ve got good process data, you know how your processes—both small and big—are performing. If you’ve got good process knowledge, you can generate ideas about how to make the process better, you have best practices measures in performing it, you know how competitors and other companies stack up on it, and you can even track the innovations, technological and otherwise, that can support the process. That range of information can help you clarify where you need im-

provement (as well as the direction it should take) and also helps you predict and diagnose process problems.

But most organizations don’t have good process information. They may know how long it takes to conduct a marketing focus group but not how long it takes a product to go through the development process. Even after experiencing a few cycles of process improvement projects, most companies don’t recognize the need to collect, distribute and use information about processes.

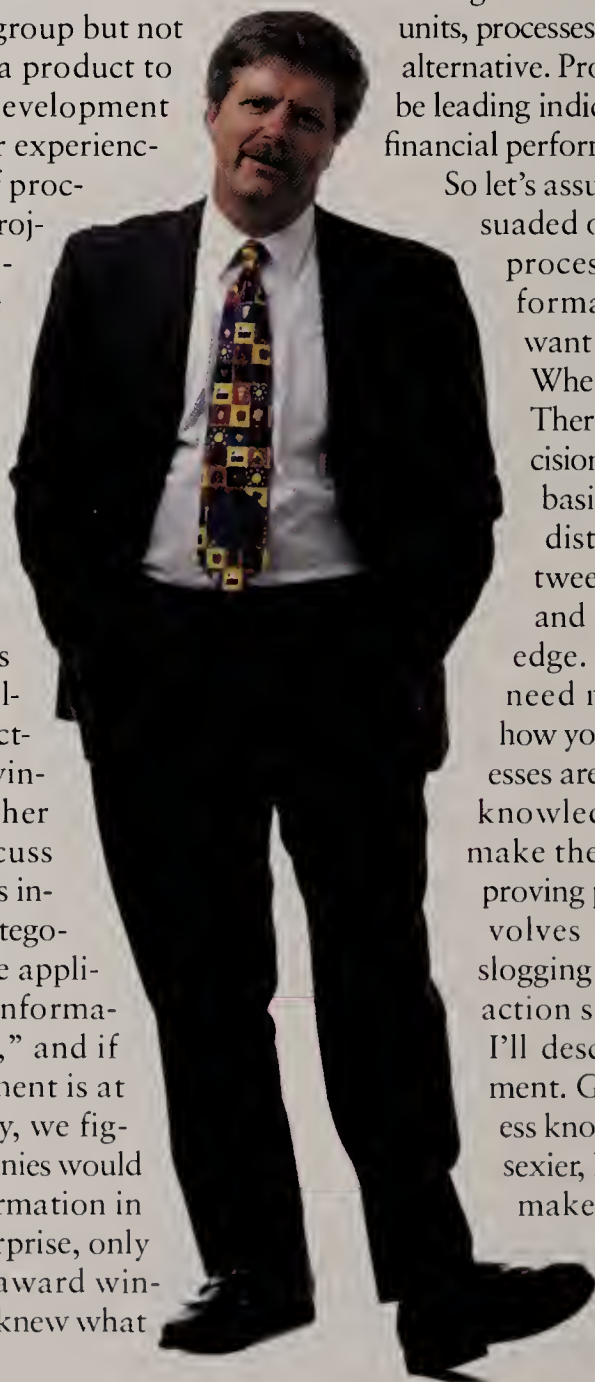
A couple of years ago, when winning the Malcolm Baldrige Quality Award was still a big deal, a colleague and I contacted 10 Baldrige winners and some other companies to discuss the issue of process information. One category of the Baldrige application involves “information and analysis,” and if process improvement is at the core of quality, we figured quality companies would have process information in spades. To our surprise, only about half of the award winners we contacted knew what

process information was or had made any concerted effort to collect it.

So even some of the most process-oriented companies in the United States haven’t fully developed infrastructures for providing process information to managers and workers. What’s their problem? Like most organizations, they have generally measured and monitored their performance using financial information, usually accounting-based. Even many accountants would agree that financial indicators alone are usually insufficient to effectively manage an organization’s performance. If companies are serious about measuring performance beyond simply bean

counting for isolated business units, processes are the obvious alternative. Processes can also be leading indicators of future financial performance.

So let’s assume you’re persuaded of the merits of process-oriented information and you want to get moving. Where do you start? There are lots of decisions to make. One basic issue involves distinguishing between process data and process knowledge. Which do you need more, data on how your current processes are performing or knowledge of how to make them better? Improving process data involves a lot of nasty slogging through transaction systems, which I’ll describe in a moment. Gathering process knowledge is much sexier, but you need to make sure you can follow the directions on a box of mac-





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Think Tank

and-cheese (collect data) before you attempt to whip up a seven-course meal for 20 of your closest friends (produce knowledge).

Many organizations, in fact, begin their knowledge management work in that familiar area of process knowledge: best practices. At Chevron Corp., for example, sharing best practices in a Notes-based database began in response to a new, decentralized organizational structure that otherwise might have resulted in little interaction across business units and functions. A "Best Practices Resource Map," organized by Baldrige Award criteria and by process, guides users to other sources of best practices. Best practices teams put the ideas to work; one team alone working on the energy-use management process produced changes that saved \$150 million annually. Strong support from Chairman Ken Derr facilitates all that work.

But creating process-oriented data goes beyond building some knowledge databases in Notes or on the Web. You know the problem: Your data is organized by function rather than process, and the data required to create an integrated view of the order fulfillment process, for example, may be spread across multiple applications and databases. So how do you convert all those types of data—functional, business unit, product-based—into process data? You'd like the answer to be cheap, quick, robust and unique to your business, but you can have only two out of four. As I see it, you have three choices.

If you want cheap and quick, go the "frontware" route, accessing multiple back-end systems from a workstation on the desk of the person involved in the process. That works if you have enough consistency so that "customer ID" means more or less the same thing throughout your company. But it's not robust: After building an ad hoc network for each major process, your IT architecture will look like a street map of Boston—lots of narrow, curvy lines with no discernible pattern—and maintaining the architecture

Gathering Process Information

1 Identify

- Choose processes that support your company's overall strategy
- Create relevant measures to gauge performance of those processes

2 Collect

- Possibly conduct statistical sampling
- Institutionalize a system to gather process info

3 Distribute

- Decide who needs the information
- Decide how to get it to them (i.e. paper or digital delivery)

4 Analyze and Use

- Pave the way for constant review of data in meetings
- Channel feedback into training programs
- Incorporate information into performance assessments

will be as frustrating as driving through the same city.

If you've got the money and the time, you can go the integrated "process package" route, buying SAP R/3, Baan or the like, and chucking all the old stuff. Those packages are technically robust, but you may be replicating the IT architecture of your competitors, and using those kinds of application packages to full advantage requires a great deal of organizational change.

Option three involves building your own cross-functional, process-oriented architecture. Sure, it can be done, but only if you are exceptionally smart or lucky. The "credit transaction automation" company VeriFone Inc., for example, rolled out its own process-monitoring software. Some vendors have succeeded in such ventures. But many more, including EDS, Hogan Systems and Continuum, have failed. Don't do it.

Most likely, you will undertake a combination of options one and two, installing an integrated package for the longer run and supporting your processes on the desktop with a frontware system. If you want to analyze process data as well as support process-oriented transactions, you'll probably also need a warehouse-mart for your data or, as I like to call it, a "process data deli," in which tasty morsels of fresh process data are served up to order. You may also want to build specific applications to collect data on order fulfillment time, costs and customer satisfaction.

OK. Suppose you've implemented all

those process-oriented systems, and you've got all the process information your heart desires. Now what will you do with it? Many companies implementing SAP R/3, for example, haven't a clue as to how they will manage when great heaping gobs of integrated process data are delivered to their screens. Is your organizational structure sufficiently process-oriented to ensure the information will be in demand? Will decisions about how well the process

is performing—and what to do about it—be made at a different place in the org chart? Will the speed of decision making increase?

Some rudimentary but still effective mechanisms for increasing the use of process information were in place at a few of the companies I observed. To encourage workers to use process information to improve their own performance, AT&T Universal Card Services offers workers a daily bonus if they achieve 96 percent of their daily process performance targets. At Dell Computer, CEO Michael Dell schedules a meeting for managers every Friday to ensure that they are attuned to process performance figures, and he usually attends as well. You have to take some measures to convert your company's information culture into a fact-based, process-oriented one.

Now that we know reengineering is a pain at best and total quality is a gargantuan time-sucker, we've got to use all the tools we can round up to make our processes better. Just having key information stimulates thinking about where performance went astray last week and how we can generate better numbers this week. No company can consider itself process-oriented if it hasn't addressed the information dimension to process management. **CIO**

Thomas H. Davenport is a professor and director of the Information Management Program at the University of Texas at Austin. He welcomes reader comments at Tdav@notes.bus.utexas.edu.

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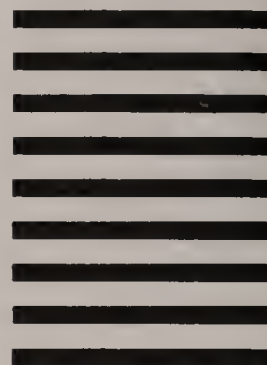


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IT'S A BRAVE NEW ENTERPRISE



The CEO Agenda

Chief executives at Fortune magazine's Fortune 500 Forum recently were treated to a day of IT workshops. While many are convinced of the strategic importance of IT, they're not so certain about their CIOs.

BY LYNDA RADOSEVICH

THE ANNUAL FORTUNE 500 Forum gives chief executives from America's largest firms an occasion to unbutton their collars, roll up their sleeves and informally debate the weightiest

issues facing big business today. A hot topic at the most recent forum, held in New Orleans in November, was the changing role of information technology. Roughly 50 CEOs (nearly twice as many as in the previous year),

representing huge manufacturing, pharmaceutical, utility, high-tech and insurance companies, flew in early not to visit the French Quarter but to attend a day-long technology workshop. The rise in attendance was a tribute to the growing recognition among the country's top business chiefs of the importance of IT.

While their presence at this event indicated that those CEOs regard IT as a strategic asset, their thoughts about their top IS managers seemed more ambiguous. As one of a handful of guest observers, I perceived a dichotomous attitude toward IS executives

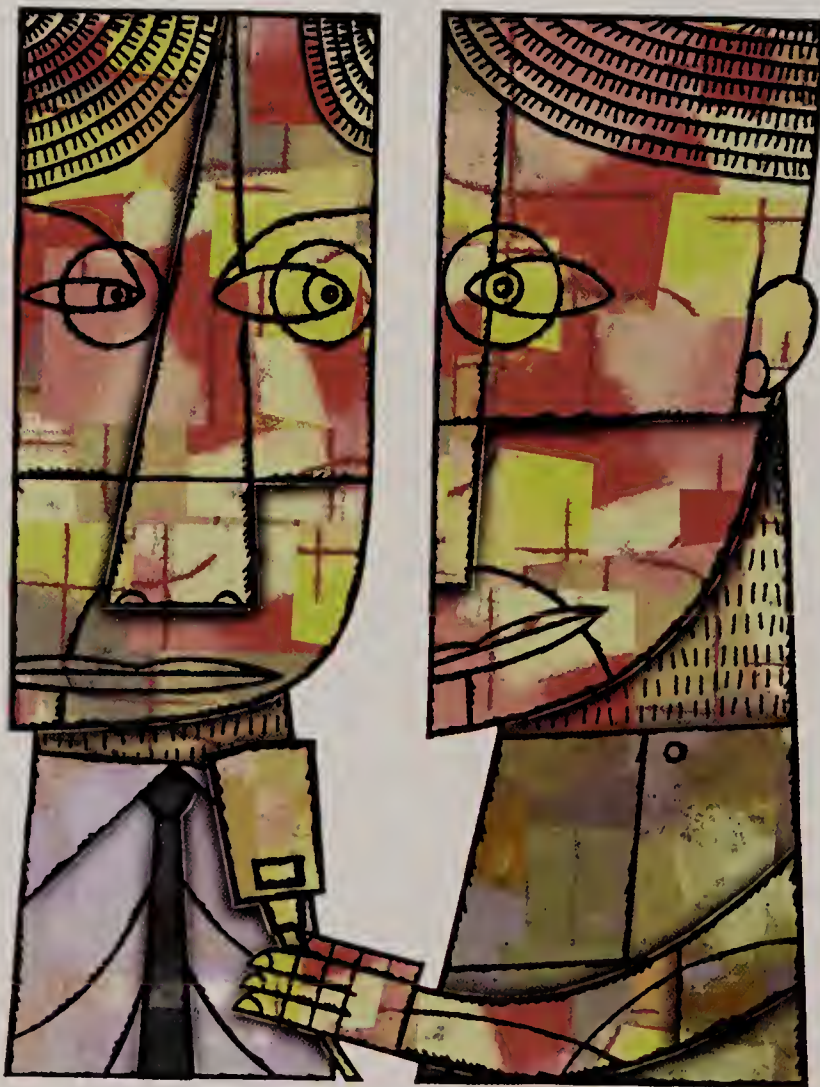
in the attending CEOs' relaxed banter and in their nods and smiles at various comments: They showed a begrudging respect for the technologists they once dismissed as nerds, but at the same time they expressed doubt about the ability of their IS executives to keep strategic goals in mind while leading their companies through technology-induced change.

That doubt isn't new, although a recent CIO magazine survey found that CEOs' perceptions of their CIOs are improving. But if the Fortune 500 Forum is any indication, CIOs still have their work cut out for them in terms of relating to their companies' number-one leaders and driving their firms' strategic IT decisions.

CEOs on CIOs

A popular topic of discussion at the forum was the tenuous state of the CEO/CIO relationship. A few possible sources of friction came to light during a session on the issue and in hallway discussions afterward.

One cause for discord may be the distance between the CEO and CIO. In a casual discussion among five CEOs, all professed that IS had become "strategic," that its role had moved beyond that of automating administrative tasks and cutting costs. Yet in none of their companies did the CIO report directly to the CEO. Instead, the heads of technology reported to the heads of operations or finance, whose primary duties include saving labor and cutting costs. Some CEOs admitted that this situation, which can exacerbate CEO/CIO misunderstandings, isn't an ideal setup. At the Tejas Gas Corp., for example, the CIO reports to the CFO, but "I don't know that that's best," said CEO Jay Precourt. And at Johnson & Johnson, the CIO position is one layer removed from the CEO, but Ralph Larsen, chairman and CEO, said the company is rethinking that arrangement. "Information technology is of



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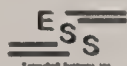


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Reporter's Notebook

such strategic significance that that individual should be involved [on the executive team]," he said.

Another possible cause of conflict is a struggle for control. As IS moves out of the back office, the CEO may become more aware of (and frustrated by) the size and questionable payback of their IT investments. Some may believe the CIO has competing interests. Lawrence Hough, president and CEO of Sallie Mae, said he canned the CIO, who *did* report directly to him, and got rid of the position altogether because he felt there were too many people involved in making decisions. Now Hough's systems group reports to the chief operations officer, and Hough and his head of marketing plan the strategic use of technology at Sallie Mae.

A related set of questions concerned where the IS function should reside—in the operating units or in central command—and whether a technologist or a business person should control IT. Opinions varied, but the more popular notions among this group seemed to be that the business unit should have power over IT and its applications. One CEO said it's easier to teach business executives about information technology than it is to teach information technology executives about business, so he lets the business people drive the strategic technology decisions. And Warner Blow, CEO of Sterling Commerce Inc., said, "line units won't put up with being told what to do." In contrast, a guest speaker pointed out that by continuously hiring decision makers from outside the IS organization, a CEO risks discouraging the brightest IS professionals and makes them ripe for being picked by rival companies.

Meanwhile, one popular speaker unwittingly did her part to reinforce the notion that technology people don't have business goals in mind. Deborah Doyle McWhinney, executive vice president of the information initiative at Visa International, gave an engaging overview of Visa's electronic commerce strategy in light of the astounding rise of the



Some conference attendees argued that the CEO should provide the strategic road map and let the business-unit managers and technology executives worry about technical details.

Internet. Among her observations was that it took 15 years before 20 million people used ATMs, but it took only two years before an equal number used the Internet. She spoke from experience, having led Bank of America's ATM efforts in the 1980s. Many CEOs were on the edge of their seats during McWhinney's talk, which was unfortunate in one sense. She couldn't help belittling systems people's expertise, calling them at various points "cowboys" who have a "new idea per minute" and believe their latest projects "will cure AIDS" but who have no clue about business strategy. It wasn't a very flattering portrait, but her electronic commerce expertise lent credence to it.

A comedian once said there are two kinds of people: those who lump people into two kinds of people and those who don't. McWhinney is one of the first kind, and she lumped information technology leaders into "those who get it and those who don't." (I believe the "it" referred to business strategy.) There is no in between, she asserted, and the only way to deal with those who don't get it is to fire them. "You can't pray for them," she said, eliciting a knowing chuckle from the crowd of executives. It appears that chief executives are as susceptible to the lure of oversimplification as the rest of us. Several CEOs and other speakers latched onto the those-who-get-it-and-those-who-don't maxim and reused it throughout the rest of the day.

Fortunately, the topic shifted at one

point to the CEO's role in the CEO/CIO relationship. Again, there was debate. Some conference attendees argued that the CEO should provide the strategic road map and let the business-unit managers and technology executives worry about technical details. But one CEO suggested that new technologies could drive business strategies by enabling companies to use products and processes that a technology-illiterate executive couldn't dream up on his own. Most nodded at the assertion that the CEO should fund and promote IT infrastructure projects in either case.

Also, there were positive discussions about the changing role of the CIO. In one session, four CIOs—Max Hopper, formerly of AMR Corp., Peter Mather of Air Products & Chemicals Inc., Bruce Parker of Ryder System Inc. and Martin Stein of BankAmerica Corp.—said that the CIO's job was more about managing change and relationships than managing technology. Several CEOs commented later that they had never realized that before but agreed with it now. Some also indicated that while they were frustrated with their own IS executives, they would love to have CIOs like those on the panel on their own executive teams.

Getting the Internet

The Internet was another prevalent topic at the conference, and the CEOs got hands-on practice surfing the Web. A CIO faced with a CEO who is cynical about technology or about IS might do



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Reporter's Notebook

well to get him into a room with a powerful PC and a T1 connection to the Internet. On the table in front of each CEO was a slick Silicon Graphics Inc. O2 workstation. The computers look like blue versions of toasters from the '50s, but they cost much more: \$6,000 apiece including monitors, according to Samuel Turcotte, manager of executive marketing at Silicon Graphics. Still, that's not much for something that can help turn a technology-phobic CEO into a Web surfer.

As the tutorials began, two CEOs' fingers flew as they touch-typed like pros. Others had trouble using the mouse to position the pointer over the Netscape Navigator icon. Technicians scurried around showing the impatient executives how to open applications and navigate the Web. There were some minor difficulties, but once they got going the CEOs were carried away by the action. Several of them ignored instructions and merrily explored links until they got lost and had to call the technicians for help. It must be humbling to be in charge generally and yet lag behind even one's own grandchildren in being able to use the Internet. "I'm pretty ignorant about what my staff is talking about, but I'm here to learn," said Edward Drudge, chairman and CEO of the Personnel Group of America Inc.

The hands-on sessions were revealing in other ways, too. Stewart Alsop, a *Fortune* columnist and partner with New Enterprise Associates, led the CEOs through a tour of good Web sites (that is, ones that let Alsop do something he personally finds useful). Some sites that caused people to linger were Stock Quotes on StockMaster (www.stockmaster.com), *The New York Times* (nytimes.com), the Wells Fargo site for online banking (www.wellsfargo.com), DealerNet for automobile comparison shopping (www.dealernet.com) and Lands' End for buying clothes (www.landsend.com). Alsop then demonstrated how some of the good sites didn't let users do fairly basic things. For instance, *The New York Times*' site



didn't let them put subscriptions on hold, and the *Fortune* site didn't let them change their mailing addresses.

Then the real fun began. Alsop began to tour bad sites, including some from companies whose CEOs were in attendance. The First Card site (www.firstcard.com) had a huge logo that took too long to load even with high-powered workstations and a T1 connection ("image maps went out a year ago," scoffed Alsop), and the only help First Card's customer service page offered was a reference to a toll-free phone number. Other credit card sites weren't much better. "None [of the credit card companies] understands the Web as a means for customer service," Alsop said. Other industries also lost points on service. When Alsop queried a search engine to find American Cast Iron Pipe Co.'s (ACIPCO's) Web site, the suggested links referred to a lawsuit involving the company. Those sites demonstrated to Alsop that "the CEO is clueless." (Van Richey, ACIPCO's president and CEO, attended the session. When I recently tried the same search, the links pointed me to the company's cheery Web pages at www.acipco.com/international.) "CEOs have to use the medium, remember the functionality of the Internet and integrate it into the core of their business," Alsop said. By the end of the session, no one was disputing him.

The CEOs learned that as they become more personally familiar with information technology, they understand its significance better and, one presumes, they can relate better to the CIO.

Some top CEOs already are there. "The first thing I did when I arrived at

"CEOs have to use the medium, remember the functionality of the Internet and integrate it into the core of their business."

—Stewart Alsop

this hotel is plug my laptop into a digital port," said Larsen of Johnson & Johnson. He said he uses e-mail extensively and does his own word processing and spreadsheet work. "For me it's a thinking tool," he explains. Larsen's personal stake in IT is reflected in the company he runs. Johnson & Johnson currently has two \$50 million IT projects underway, and Larsen said he considers investing in IT as important as investing in new factories.

Larsen isn't alone. "Five years ago, you never would have seen interest like this from chief executives," said Bruce Ryder, CIO at Ryder System Inc., one of the guest speakers, referring to the number of CEOs at the technology workshop.

And even the CEOs who were less savvy in the ways of IT were honest about their inexperience. After the PC and Internet revolutions, CEOs are realizing that their customers and employees will forge ahead whether or not the CEO is involved. One company went to put up a corporate Web site and found that several of them had already been put up by individual departments. Department-level webmasters had painted the company's face to the electronic world. CEOs must answer the question of whether or not they are going to manage the process and stay in synch with their customers and employees. "We're trying to bridge the [gap] between the 50-year-old salespeople and the kids who understand this," says Bob Burhmaster, CEO of Josten Inc. in Minneapolis. Who better to build those bridges that the CIO? **CIO**

Lynda Radosevich is a senior editor for InfoWorld. She can be reached at lradosev@interserv.com.

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Platform

Is client/server ready for heavy-duty transaction processing? Maybe, but only if you build it for the right task and the right number of users.

BY DEREK SLATER

Terry Jones of Sabre has decided against taking the client/server plunge.

Diving

First

THE CALLER WANTS TO KNOW

if seats are available on the red-eye from Los Angeles to Washington.

Then: Would it be cheaper to wait and take a daytime flight on Saturday? OK. Can I get a window seat? I love the view of the Capitol as you approach. Don't put me right over the wing. And I also need to get to New York on Tuesday's first flight. Oh—specify vegetarian meals on both trips. I can't stand those nasty pizza pockets they serve. And so on. Two flights booked, seats assigned and prices verified in a matter of minutes (though it probably seemed much longer to the beleaguered travel agent). Now imagine a peak volume of about 5,000 such transactions per second, and you're looking at the workload of Sabre, the massive airline reservation system. To cope with that torrent of messages, Sabre has eight interconnected, high-end IBM mainframes and an array of supporting hardware chewing through

Reader ROI

THIS ARTICLE IDENTIFIES prevailing attitudes in IS about mission-critical client/server transaction processing, its potential benefits and key technical obstacles. By profiling several companies with client/server OLTP systems, this story provides a set of criteria to help CIOs decide if a similar move is right for their businesses.

two mirrored copies of a 1.5-terabyte database. Sabre is housed in a concrete bunker five feet underground in Tulsa, Okla.; the survivalist system can operate for three days without outside electricity or water. Now that's transaction processing. And as Terry Jones, president of Sabre Interactive and CIO of The Sabre Group, in Dallas, says with some understatement, "We haven't found a way to take all that to a Unix architecture yet." Sabre is an extreme example of an online transaction processing system, but OLTP applications in general have remained safely ensconced in familiar big iron even as administrative and decision-support functions have plunged with abandon into client/server waters.

Still, there are some appealing reasons for OLTP applications to follow suit. The temptations to take the risk include visions of multiple database views for expediting and enhancing customer service and the hope of reduced training requirements, thanks to the now-familiar Windows interface. But for many companies, OLTP systems for credit card authorization, airline and hotel reservations, and banking transactions are the heart of the business. Those who try—and fail—to migrate such systems to a client/server system will find no lack of experts willing to chime in with an, "I told you so." "What we've learned after 10 years is the client/server paradigm does not scale up, isn't highly reliable and is almost impossible to maintain," says Richard Finkelstein, president of Performance Computing Inc. in Chicago.

So is it a bad idea, plain and simple, to migrate crucial systems to client/server? Not necessarily. Some companies are flouting that conventional wisdom and moving critical OLTP applications to client/server—and say they are quite tickled with the results. Anyone seeking to follow their lead, through, shouldn't leap without looking carefully at a few significant issues. First, these companies' definition of "mission-critical" transaction processing may differ significantly from yours. There are also concerns over cost, immaturity of development tools and the bogeyman of transaction processing: downtime. Your company's ability to address those issues will help you decide when you should stick with a mainframe and when you might want to take a platform dive.

Critical Definitions

ONE SUCCESS STORY is that of the Motorola Computer Group, based in Tempe, Ariz., whose most crucial system is an MRP II manufacturing application. MCG manufactures computer systems based on parent company Motorola's RISC technology. The manufacturing system requires round-the-clock availability seven days a week, according to Paul Watz, director of information technology. It handles around 125,000 transactions a day using Informix databases and CICS migration tools from UniKix Technologies, based in Phoenix. Watz ticks through a long list of reasons he's happy about the change to client/server. In addition to providing windowing capability at the desktop, the Unix operating system gives MCG the flexibility to run applications on multiple platforms and to add capacity selectively if a particular application needs more processing power.

Still, an MRP II system is quite a different animal from what passes for mission-critical transaction processing in other industries, such as banking. The very term mission-critical seems to be expanding in scope. At bank subsidiary First Chicago-Mercantile Services and AT&T Corp.'s Consumer and Small Business Division, for example, the term also encompasses customer service applications. First Chicago processes electronic tax payments from business taxpayer accounts to the IRS; the associated customer service system supports 50 representatives, with plans to reach 200, and links to a back-end Informix database that First Chicago has benchmarked to record a million transactions per hour (Sabre's peak rate is 18 million transactions per hour). The system has to run continuously, as many transactions arrive in batches in the middle of the night. AT&T's system supports 7,500 service representatives, according to Mike Owdij, technology consultant at the company's Piscataway, N.J., office. The customer service application

as well as the company's order-entry system run on a client/server configuration managed by Tuxedo, BEA Systems Inc.'s distributed transaction monitoring software for Unix. "Can you run mission-critical applications on client/server? Yes. We're doing it," Owdij says emphatically.

Of course, the meaning of client/server can be nearly as fluid as that of mission-critical. AT&T's system consists of three tiers, but the back-end tier actually still consists of mainframe data servers, now surrounded by application servers and gateway processors. "I've asked this of many CIOs, and each has a different definition of client/server, which is whatever they happen to be doing," says David Floyer, a research director for International Data Corp. in Framingham, Mass., which has the same parent company as CIO Communications Inc. So when you hear client/server stories, consider whether the definitions fit what you propose to do in terms of the architecture as well as the application.

Can mission-critical OLTP systems run on client/server?
Mike Owdij
of AT&T is doing it.





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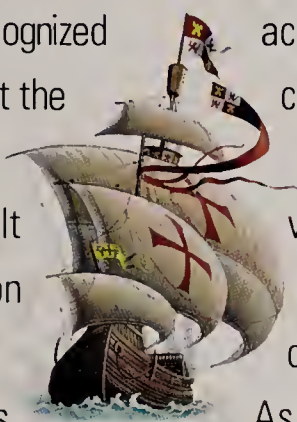
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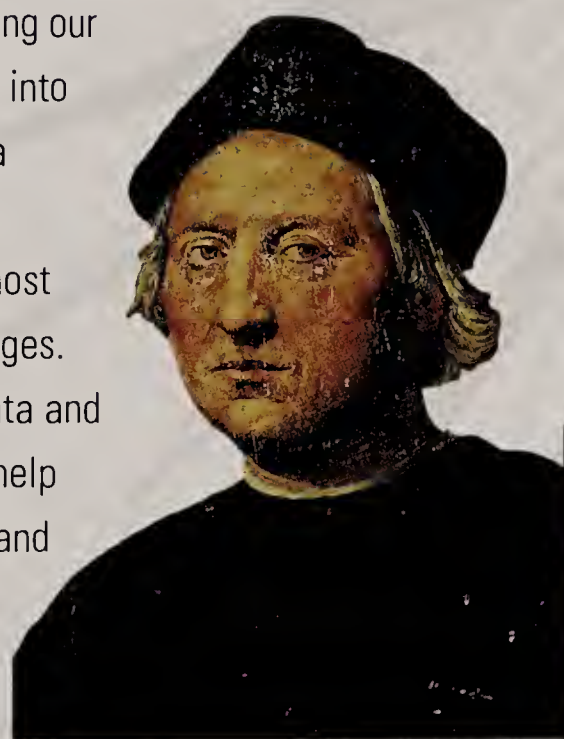
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Dan Dixon of John Hancock Mutual Life Insurance cautions that tools are not mature for these waters.



"If the data is sitting there on a mainframe, why bother? It would be a pretty stupid waste of resources, put bluntly," he explains. But client/server costs are predictable up to a point. "Once you get over about 200 users [logging into a single application], the costs go up significantly," says Floyer. "Below that level, they're very safe, very reliable; but above that mark, you have to do a lot more work to make [client/server] work like a mainframe."

Aside from cost, the task of migrating the OLTP application itself can be a headache because the development tools are still immature.

Carlson Hospitality Worldwide recently decided to move its central reservation system to client/server and had difficulty finding the right tools. Carlson is a brand management company whose lodging operations include Radisson Hotels Worldwide, Radisson Seven Seas Cruises, Country Inns & Suites By Carlson and Regent Hotels International; the company's reservation system handles 30,000 to 40,000 transactions per day. Scott Heintzeman, vice president of reservation and information services for Carlson, says the company finally settled on tools from Forte and hired the Born Information Services Group, a developer located near Carlson's Minneapolis headquarters, to help build the client/server application.

Controlling Costs

OTHER CONCERNS ABOUT THE client/server paradigm deserve close examination as well, such as potentially high costs and the lack of mature development tools. The price tag for buying and maintaining desktop PCs and PC software can be so high that some observers say cost alone makes client/server a dead platform. "How does a company deploy thousands of PCs and applications and then maintain them over time? The cost is astronomical," Finkelstein says. Various studies peg the annual cost of PC-based client/server computing at anywhere from \$6,000 to \$12,000 per desktop. However, that cost is not necessarily attributable solely to the OLTP application, because so many companies have already installed a PC-centric architecture for decision-support and other applications.

Watz sees the cost issue as a matter of perspective; for starters, he says most of the corporate world is installing PCs anyway. Reworking mission-critical applications for client/server in such cases merely means taking advantage of the MIPs already available at the desktop. He adds that MCG has cut its total IS budget by 60 percent over four years by moving to relational and client/server technology rather than continuing to use mainframes. Still, many others are skeptical about client/server costs. AT&T chose presentation servers and X terminals instead of PCs as the third tier of its architecture, based on lower anticipated cost of administration, operations and maintenance over a six-year life cycle. Another option is the use of Web browsers as the client for transaction processing, which can eliminate the cost of client development tools and time (see "Never Too Thin," Page 52).

But building a PC-based client/server infrastructure from scratch now would be prohibitively expensive, says Floyer.

Real Downers

AS IMPORTANT AS MONEY AND development-tool issues are, Carlson's project points to the single most pivotal challenge for client/server OLTP systems: availability. Reservation systems have a more direct and immediate connection to the corporate wallet than most customer service applications. Carlson logs 43 percent of its hotel revenue through the central system. "If it goes down, it's definitely a major inconvenience for our customers, although they can still make reservations at the hotel level," says Heintzeman.

Sabre lacks even that fallback. For the airline system, Jones says, 15 minutes of

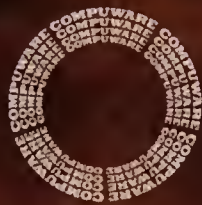
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downtime spread out over a week would be 15 minutes of dubious fame. Agencies in 70 countries around the world access Sabre, and global access will continue to grow as Travelocity, a Web-based service allowing consumers to run their own queries against the Sabre system, picks up steam. Already more than 650 million consumers have signed on for Travelocity membership, though the number of users logged on at any given moment is obviously far less. "The Web never sleeps, and you don't want it to because you want the cash registers to ring all night," says Jones.

CIOs generally agree that client/server platforms cannot yet deliver the kind of continuous availability offered by mainframes. The most obvious source of downtime is machine failure. Computer system companies specializing in fault tolerance and high availability—among them Stratus Computer Inc., Tandem Computers Inc. and NetFrame Systems Inc.—carry a reputation for charging high prices and using proprietary parts and operating systems. Most of those companies are now on the "open systems" band-

transaction load, and a spare system handles less critical functions such as internal reporting while standing by in case the primary server goes down. "It's not sitting there totally idle. If the first system fails, we will see a hit in performance, but the system is fault-resilient," says Watz. Both processors sit in the same room at MCG. First Chicago has a "warm spare" site, replicating in real-time just over 600 miles away from the primary processing site, to be used in case of fire, flood or other disaster.

Another factor that contributes to downtime is that distributed systems have a lot more moving parts than comparable mainframe environments; duplicating the server hardware is only a partial solution. Testing a newly constructed client/server platform for interoperability and reliability is a daunting challenge, IS professionals say. "You have to deal with so many different products; essentially you have a chance for error with every product," says Maribeth Anderson, manager of technology at First Chicago in Chicago.

"The Web never sleeps, and you don't want it to because you want the cash registers to ring all night." —Terry Jones

wagon, redesigning their systems using standard components like Intel processors and Windows NT or common Unix flavors. Even so, many users have chosen other routes rather than ante up for fault-tolerant and high-availability servers. One common choice is simply to buy standard PC or Unix hardware—and lots of it. At AT&T, says Owdij, "if one site needed eight servers, we put in nine and spread the [processing] load." If one of the servers fails, the transactions are automatically rerouted to the other servers in the same location. "We wanted high availability, but we didn't want to pay for it," he says.

At companies where the servers are not centralized in a single location, the server hardware may be duplicated entirely. MCG (which has the advantage of manufacturing its own computers) uses two servers: One functions as the primary processor that handles the

AT&T's Owdij says testing was perhaps the weakest phase of the company's move to client/server. In the mainframe environment, he notes, elements of the system and network either work or fail. The client/server platform seems to be more temperamental. "You tend to test for the sunny-day scenario when everything's up, then the rainy-day scenario when something's down," he says. "But you don't tend to test for conditions like, 'I've got a flaky router out there, and it goes up and down several times in 10 minutes.'" AT&T designed new analysis processes to deal with boundary conditions, but, as Owdij says, "unfortunately it wasn't completely transparent to the users. We dealt with the problems, but [downtime] did happen."

Further contributing to the problem is a paucity of mature systems-management tools, according to Dan Dixon, a

Never Too Thin

The Internet may be the future of client/server transaction processing

DAUNTED BY THE COST of developing and distributing client applications, many companies are examining the use of the thinnest client possible: the Web browser. This "Internet model" promises some of the key benefits sought from client/server computing—such as a familiar, graphical interface—but keeps all maintenance and updating on the central system, be it mainframe or server. There is potential for further savings through use of stripped-down "network computer" clients instead of full-blown PCs, which can reduce hardware costs. "It's simply cheaper to do the work," compared with client/server OLTP, says David Floyer, research director of International Data Corp. in Framingham, Mass.

Software that converts legacy data streams to HTML output is already available, which means the data can remain on the mainframe. That bodes well for the scalability of the system as well as the cost.

Analysts generally are enthusiastic about the model's prospects for OLTP applications. "It's a server-centric model with a high degree of predictability and performance but also high usability using HTML or Java," says Richard Finkelstein, president of Performance Computing Inc. in Chicago. Finkelstein expects other forms of client/server development to trail off as the Internet paradigm is refined over the next year or so.

For more about the tools and methods that make the Internet model work, see "Beyond Client/Server," *CIO*, March 1, 1997.

—D. Slater



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veteran of the banking industry and now chief technology officer at John Hancock Mutual Life Insurance Co. in Boston. "There's a particular lack of diagnostic and testing tools—they aren't even close to the maturity of the mainframe environment," he says. Once the system is built and put into production, Dixon says, it is still quite possible for elements to fail without alerting the IS staff as to where the problem lies. Dixon advocates avoiding client/server for truly mission-critical applications for that reason as well as because of the current lack of training, education and knowledge about the complex environment surrounding client/server technology. The computer industry is scrambling to fix the systems management challenge; for instance, Computer Associates International Inc.'s CA-Unicenter distributed systems management tool and Cabletron Systems Inc.'s Spectrum hub-and-network management software are now highly interoperable.

But that's only a beginning, says Nina Lytton, president of the consultancy Open Systems Advisors in Boston. "You could say it's the long-overdue triumph of the obvious," she says of the Cabletron-CA cooperative effort.

Dealing with Upgrades

YET ANOTHER CONSIDERATION related to system availability: Hardware failures and glitches aren't the only sources of downtime. Even as testing and troubleshooting tools mature, they can't circumvent the periodic need to update software or reorganize back-end databases. The mainframe can be updated more or less on the fly, but fixing Unix systems typically requires taking the system offline. According to Sabre's Jones, that is probably the most crucial hurdle for client/server vendors to overcome in order to handle true 24/7 applications. Here again, technical solutions are gradually emerging. For example, Partners HealthCare System Inc. in Boston has had success making changes to middleware services without interrupting service, using Open M software

from InterSystems Corp. that is based on "what historically has been called MUMPS technology," according to Steve Flammini, corporate director of application development for the company. Partners HealthCare operates several hospital facilities and runs its physicians' order-entry system, handling several hundred thousand transactions per month on a PC-based client/server setup, according to Flammini.

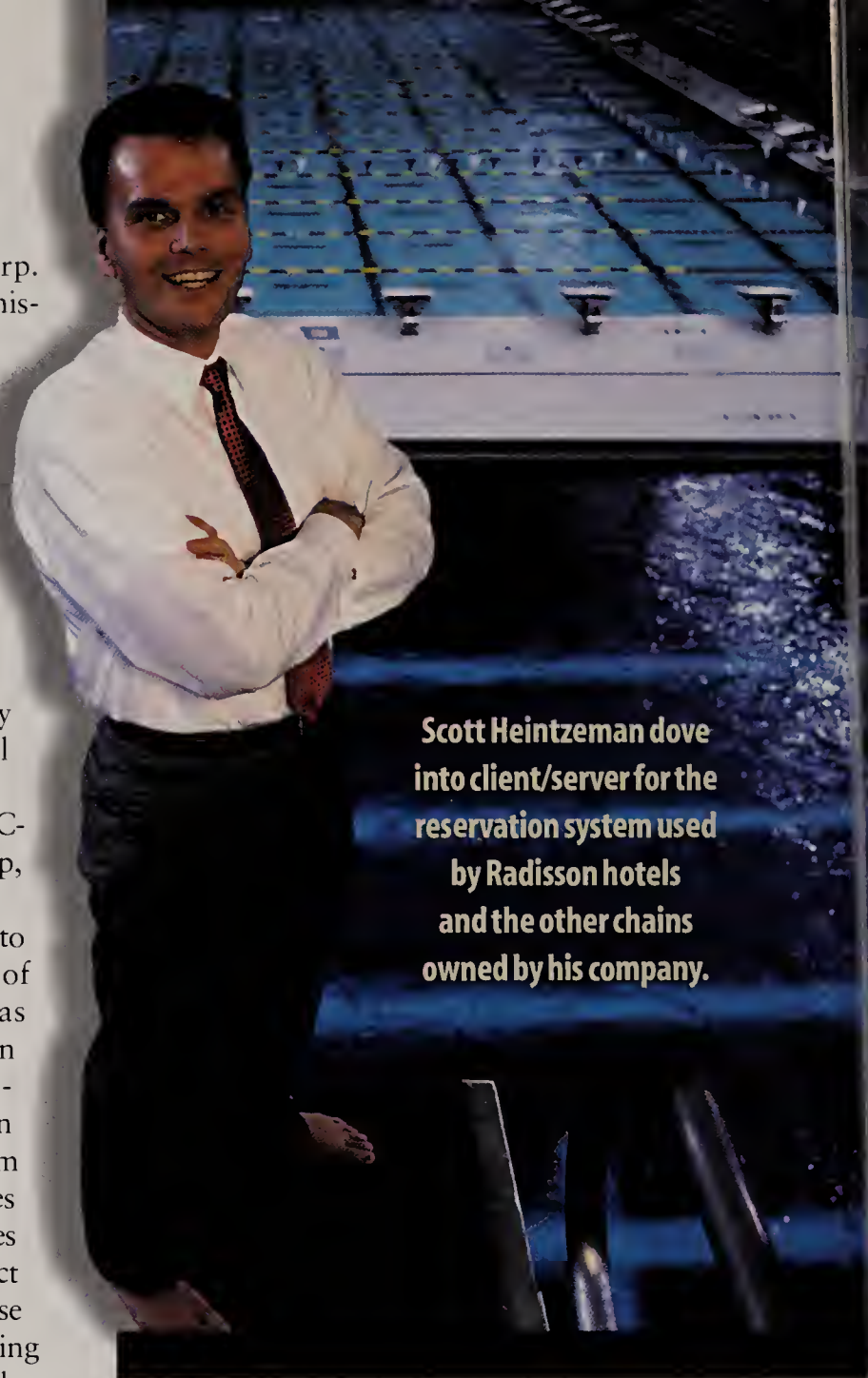
Another solution was to purchase yet another set of server hardware—one as the primary transaction processing server, a second server for decision support and a third system for development, updates and configuration changes that has been set up to act as a backup system in case of failure. Carlson is taking that approach by using three Hewlett-Packard Unix servers connected by a fiber-optic backbone. Each server focuses on one of the three main functions in addition to providing backup for the other two. The tradeoff is that the solution adds still more to the price tag.

Carlson, however, anticipates that the costs will be offset by additional revenue coming in through new distribution channels. "We believe the only way we can remain technically agile is through client/server," says Heintzeman. "There are so many companies and suppliers wishing to have access to our information and distribute our inventory. We think client/server is the way to do that." Carlson's concerns about potential downtime were alleviated somewhat by a glowing reference from New York city's 911 emergency response system, which was built with the same development tools that Carlson had selected.

Jones, on the other hand, says that because of all the concerns over availability, true client/server computing is at least a couple of years away from being a viable platform for systems of Sabre's

magnitude. John Hancock's Dixon agrees that banks are not likely to move their financial systems soon, and indeed, First Chicago's parent company, First National Bank of Chicago, still runs all its key banking functions on mainframes. The subsidiary was created when the parent company won an IRS contract, so its offspring was able to build its client/server application from scratch rather than move an existing mainframe system. That is one of several conditions that creates a more hospitable environment for client/server OLTP. Companies that already have a client/server infrastructure in place for other applications are also at an advantage as the cost tends to be more palatable. Smaller transaction volumes also help, and OLTP applications that are critical to the corporate mission yet still allow for occasional downtime are less likely to sink. "For us, there is no acceptable downtime," says Jones. 

Staff Writer Derek Slater can be reached at dslater@cio.com.



Scott Heintzeman dove into client/server for the reservation system used by Radisson hotels and the other chains owned by his company.

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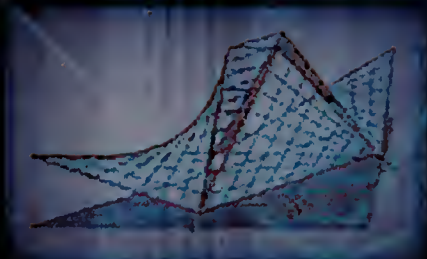
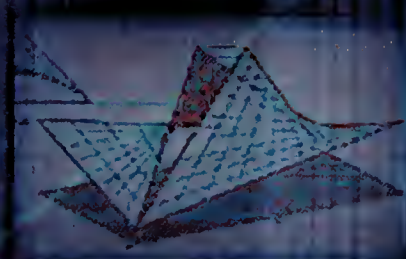
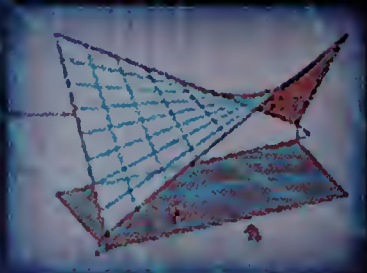
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Success

Smart organizations are using data models to escape the snares of data warehousing

Reader ROI

REMEMBER BUILDING MODELS AS A CHILD?

When all went smoothly, those miniature cars or planes were fun to create. But often it seemed as though the blasted instructions never fully explained how all those little pieces fit together. The glue would drip in the wrong place, or sometimes a crucial part would be missing. Well, the grown-up IS version of that childhood pastime is building a model of the way information flows through your organization. Lucky you. Called a data model, this graphical representation defines and categorizes an organization's data resources and shows the paths among them. A data model of a supermarket chain, for example, might depict sales volume, store locations and time of sale for specific products sold. The model would define each category and the data it comprises. Later, the links between categories could be exploited with data mining. For instance, cross-referencing "geographic location" with "products" could reveal which regions of the country buy the most Head & Shoulders shampoo.

CREATING A DATA MODEL, or map of where data sources reside within a company, is the crucial first step in building a data warehouse. But it is a difficult process, often fraught with political and logistical pitfalls. In this article, readers will learn:

- ▶ Strategies for avoiding political infighting
- ▶ How to adjust the modeling process to accommodate an organization's corporate culture
- ▶ The extent to which users should be involved in the data modeling process
- ▶ Why building incrementally is better than trying to do everything all at once

DATA MODELING

A data model can range in complexity from a simple picture sketched on a napkin to a detailed flow chart made with a computer-aided software engineering tool. Regardless of the form a data model takes, however, creating one is a crucial first step in designing a data warehouse. "No database was ever built without at least an implicit data model, just as no house was never built without a plan," says John Rome, assistant data administrator at Arizona State University (ASU) in Tempe, Ariz.

Unfortunately, building a data model isn't nearly so much fun as building a miniature plane. When a piece doesn't fit properly, it's not enough just to slap on more glue and turn that side to the wall. An effective data model must provide a clear picture of where an organization's data lies and how it's defined. Just as a defective blueprint for a building could result in dangerous structural flaws, a poorly designed data model can topple a data warehouse before it's even finished. And in addition to being logistically difficult, data modeling carries with it all sorts of sticky political considerations. Getting different departments to abandon their familiar modus operandi for the greater good can be next to impossible. Data modelers may find themselves stuck between senior managers pushing for immediate results and business units engaged in defensive, territorial posturing.

Data modeling tools from vendors such as Logic Works Inc., Sybase Inc. and IBM Corp. facilitate the construction of an enterprise's data structure by creating optimal data model, but they are useful only to a point. Software and hardware obviously can't get a company out of its political quagmire. "The great lie of data warehousing told by people who want to sell a modeling product is that when you do a project, all the departments will agree," says Alan Paller, director of research and education at The Data Warehousing Institute in Bethesda, Md. "People need to realize that sitting down to think of a model or buying a tool from a vendor doesn't necessarily lead to agreement."

Know Thy User

S O WHAT'S A MODELER TO DO? Certain steps are mandatory in building a data model. First, modelers should poll business users to ascertain their information needs. Next, they should analyze and consolidate the feedback. They should build a prototype data model and take it back to the users to make sure it actually addresses their needs. And finally, they should update the model based on the new feedback.

But within that process there is also room for adjusting to the organization's culture. For example, ASU spent the last four years building several models for different sections of a large data warehouse that holds information about courses, stu-

Some Data Modeling Tools

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Sybase Inc.
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Fast Start Solution Template

Red Brick Systems Inc.
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www.redbrick.com

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New York
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Rational Rose

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www.rational.com

The Process Model

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Dayton, Ohio
513 445-5000
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dents and the school's finances. As Rome and his colleagues built a model for each section of the data warehouse, they learned more about how, when and to what extent they should involve end users in the data modeling process.

The first model for the student demographic section of the warehouse was the most difficult to make because Rome and his colleagues were relative novices. Twenty users were asked to spend weeks in large group meetings describing their information needs. Rome even offered users one- to two-hour classes—a sort of "Data Modeling 101"—so that they would understand the data modeling process better. He now acknowledges that that was a mistake. "The end users were helpful, but it wasn't imperative that they knew all the concepts of data modeling," says Rome. "It is IS's job to translate what they want into good material."

Rome applied what he learned from the first model to the next go-round—a human resources data model. HR was too busy to devote much time to helping IS, so instead of explaining the process in detail and gathering everybody together for a group brain-dump, the IS team split up and went directly to

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What's Normal? *That depends on what you want to get out of your data*

WHEN ARIZONA STATE UNIVERSITY began building a data model, its data administrators assumed that the process would be similar to building a model for a single transactional system or a simple database. They were wrong. "We needed to learn that data models for data warehouses are a whole new animal than the typical systems we were used to," says John Rome, assistant data administrator at ASU in Tempe, Ariz.

Most non-warehouse models call for "normalized" data storage, which means that all the data is stored in one place. Normalized databases are easy to update and don't require much storage space, but they may not be appropriate for data warehouses because they're slow at processing. "If performance matters, you don't want to glue three tables together to get a name, address and product," says Alan Paller, director of research and

education at The Data Warehousing Institute in Bethesda, Md. "You want it all in one place so you can process it instantly."

Denormalized databases, on the other hand, store data in more than one place to expedite processing. That makes updating the data more difficult because the same piece of data is stored in several places, which may work for data warehouses that are primarily used for queries and

rarely updated.

Vendors offer seven different levels of normalization. "If you choose the wrong data model—like if you choose a highly normalized database for a decision support application—you're probably going to affect performance right off the bat," says Steve O'Brien, director of product marketing for data warehousing vendor Red Brick Systems Inc. in Los Gatos, Calif. "As your data grows and you need to load more information, it's

going to be more difficult to maintain the database and keep all the tables consistent. And that could mean the difference between getting an answer back to your query in three seconds versus three days."

—J. Bresnahan

If you build it, they will come

Lessons learned from data modelers

Seek user input.

Poll users to determine their information needs.

Analyze and consolidate feedback.

Show prototype to users; make updates based on new feedback.

Think small.

Don't bite off more than you can chew.

Build incrementally.

Be prepared to change the model.

Stay open and flexible. Don't be afraid to adjust the

process to reflect your organization's culture and politics.

Be patient. And get commitment from users to be patient also.

Don't look for perfection. A data model should be constantly tweaked.

users' workplaces to talk with them in small groups.

By the time IS created its third data model for financial information, the concept of data warehousing was familiar to users. It also didn't hurt that the assistant comptroller of the university championed the modeling process. "He knew data and had a reputation that people trusted," says Rome. As a result, IS was able to get a high level of involvement and input from the university's financial department.

Not having a champion in upper management doesn't necessarily sound the death knell for data modeling, however. The Washington-based Environmental Protection Agency's strategy of building a prototype can work just as well.

The EPA's IS group started to build a data model three years ago for an enterprisewide warehouse without soliciting any kind of input from business users in the other offices. Normally that approach is not smart, but it happened that everyone in the IS group had spent time in other EPA business units before migrating to IS, so they understood the business as well as the end users did. The finished product, called the Envirofacts warehouse, is helping change the agency's culture from one of isolated

offices that had rarely mixed to that of a collaborative, integrated organization that takes a holistic approach to protecting the environment. "Have a success story and then engage the rest of the enterprise in a full-blown effort," advises Pat Garvey, director of the Envirofacts warehouse. "Let that success bring people to the table."

The personalities of both IS staffers and end users also can determine whether a data modeling endeavor





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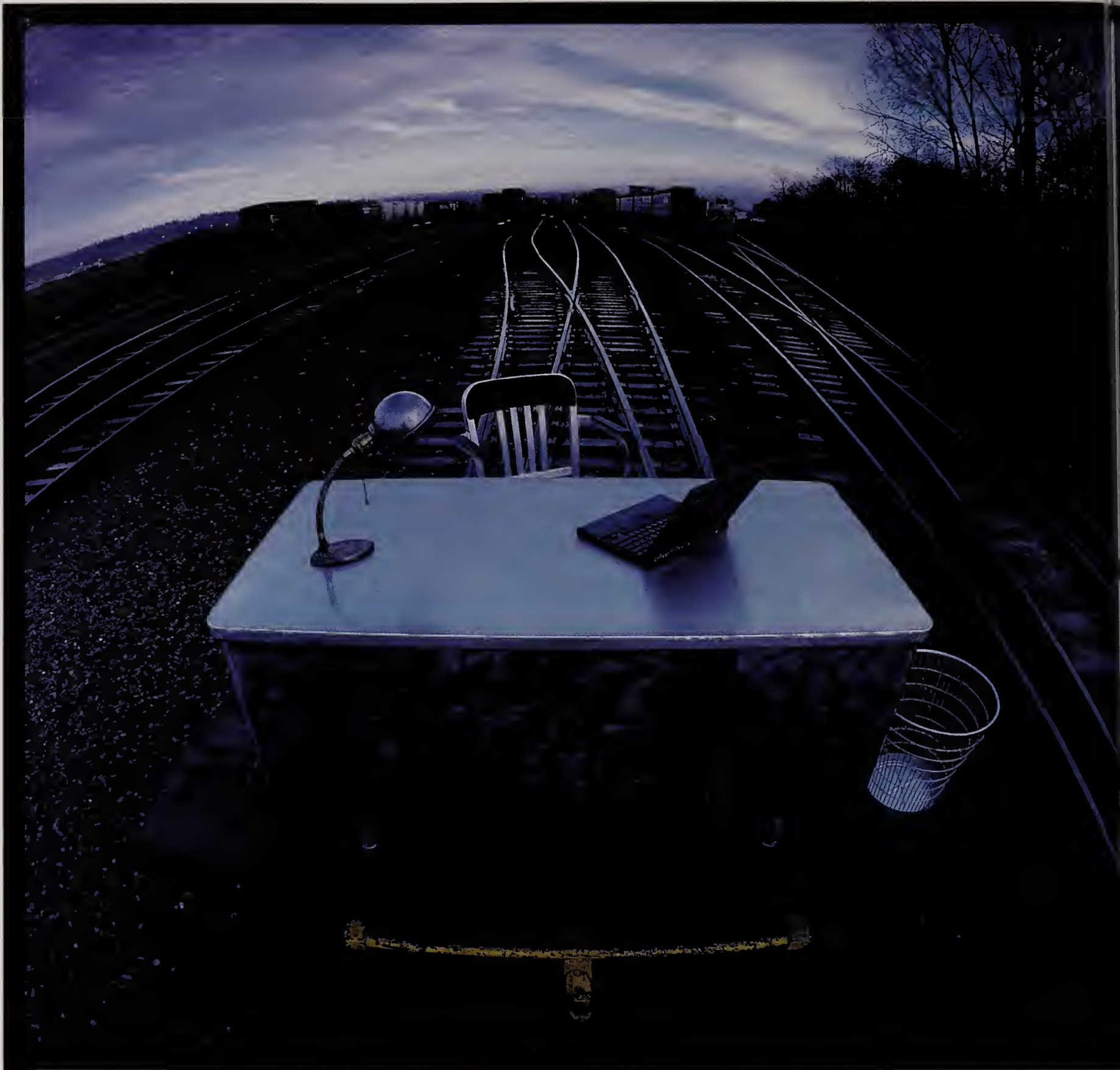


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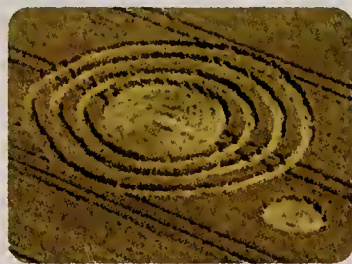


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"When defining by decree, a company needs to designate somebody with the authority to say, 'We're using five different terms, and we have to agree on one. This will be the one. Period.'"

—Martin Schedlbauer

or will be successful, says David Brown, manager of applications development for Buffalo, N.Y.-based frozen food manufacturer Rich Products Corp. Rich Products currently is in the pilot stage of building a warehouse that encompasses several financial departments. When Brown first started putting together his company's data modeling team, he thought long and hard about who should participate. "We looked for people who were flexible, open-minded opportunists and who would be able to implement and market the project," he says. Eventually the warehouse will be rolled out to the entire organization.

Build Small, Build Smart

THE BIGGEST MISTAKE THAT DATA modelers can make is biting off more than they can chew. For many companies, a data warehouse that integrates data from many different departments is the ultimate goal because it makes cross-functional analysis possible. But mapping out the data of an entire organization in one sitting rarely makes sense; in fact, construction of a large data model can take several years and turn sour in the process. "You can say you're going to take a corporate approach, top down, and define an environment and the meta data for an entire corporation, but that is typically a three- or four-year endeavor and frequently ends in failure," says Donald DePalma, a senior analyst in the Software Strategy Service at Forrester Research Inc. in Cambridge, Mass.

Fashioning the data model in pieces gives IS time to collect user feedback after each iteration and improve the next rollout. Rich Products, for example, plans to build an enterprisewide warehouse, but first the company is concentrating on a data model for its financial division. "We took a small piece of the business because we knew it would take us so long to model the enterprise, and the business wouldn't wait," says Brown. "It was our first taste of data modeling, and we had to climb the learning curve."

The data modeling team at Washington-based diversified financial company Fannie Mae also built its data model incrementally but with a slightly different twist. Its IS team worked concurrently on creating both corporate- and project-level models. (A corporate-level model aggregates all business-process data into categories, such as products and customers, whereas a project-level model is limited to one business-process transaction, such as buying a loan.) Users offered feedback on the project models that affected the corporate-level model.

"It was very hard for business people to focus on an abstract modeling technique and really understand, out of context, what they were validating about a specific project," says Peter Kopperman, director of information management strategy at Fannie Mae.

The Definition Dilemma

BUILDING A DATA MODEL IN STAGES makes the process more manageable, but it doesn't eliminate political infighting over definitions. If anything, it just ensures that only one set of conflicts will arise at a time.

Trying to get different departments to agree on a common set of definitions is no easy task. Consider the case of a large insurance company that recently spent more than \$1 million in 14 months on a data warehouse before discovering it had to kill the project because its five lines of business couldn't agree on the definition of "product," says The Data Warehousing Institute's Paller. "One has to be realistic about the scope of what an entire complex business organization will agree to," he says. "It's unrealistic to expect everyone across every business unit to view it consistently. It becomes somewhat of an art to understand what can be defined and managed."

Cross-departmental squabbling can be minimized so the project doesn't grind to a halt. Fannie Mae's data modeling team, for instance, got around the issue by creating a kind of oligarchy. It didn't bother looking for universal consensus. Rather, the group hashed out term definitions and issued a company-wide data dictionary. "Once the data definitions and dictionaries were out there, people were less likely to expend the energy to tweak them," explains Kopperman. "It was much easier to say, 'This is it.' If users really aren't happy with what you give them, you can collect their feedback and come back with something that reflects their input. But don't try to wordsmith by group consensus. That never works."

That dictatorial strategy worked for Fannie Mae because its upper management supported the data modeling team. "When defining by decree, a company needs to designate somebody with the authority to say, 'We're using five different terms, and we have to agree on one. This will be the one. Period.'"

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"We used some common-sense standards in the beginning and decided to create our data model using nomenclature that's very logical when integrating data."

—Pat Garvey

says Martin Schedlbauer, president and CTO of Technology Resource Group Inc. in Wayland, Mass.

The EPA took a riskier approach to winning the definition war. Garvey and his team didn't bother to look for advice, much less agreement, from users. Because everyone in IS had business backgrounds, they "borrowed" the offices' data to build a model and warehouse that was separate from the departmental proprietary databases. All of the offices' original records and data dictionaries were left intact.

The chances of that kind of strategy backfiring are high, but Garvey and his team figured that the EPA's offices were so territorial by nature that trying to get them to collaborate on an integrated data model was pointless. The EPA comprises the enforcement office and four separate environmental offices—water, air, hazardous waste, and pesticides and toxins—that were all formed at different times "with systems that were the flavor of the year," according to Garvey. The offices had rarely mixed, and each has its own statutes, federal mandates and regulations. Over the years, they have built up an aversion toward sharing resources; Garvey was often refused when he asked for information in a departmental database. "Turf was the name of the game," he says. "They didn't see any need to open up their backyard."

As a result, the data definitions between offices weren't even close to being uniform. What one office might call a "site," for example, another would call a "facility" or "company." "It's politically tough," says Garvey. "You're not going to get people to say, 'I'm going to change this definition because it's good for the agency, or even the environment.' Instead they'll say, 'I'm happy with what we're doing.'"

The IS group set about creating a separate enterprisewide data model that linked data by the barest minimum term: "facility." "We used some common-sense standards in the beginning and decided to create our data model using nomenclature that's not very specific to the regulation, but very logical to integrating data," says Garvey.

At first the offices couldn't be bothered with the warehouse. But as new systems were brought into the warehouse and the public started extolling its virtues—the EPA's Web-based data warehouse gets 125,000 hits a month—the warehouse seemed much

more attractive. Suddenly the offices were interested in cooperating to create an enterprisewide data model that would integrate them more fully. "Now they all want in, and we've got the critical mass to sit them down and say, 'Folks, I've made these decisions as database developer. Now let's do it the right way and set some data standards,'" says Garvey.

Not all situations can be resolved so nicely. Sometimes it's just not possible to get everybody to agree. In such cases, all IS can do is reflect the users' differences in the data model. "You want the entire company to adopt a common terminology and process, but how do you get a few hundred departments to agree?" asks Schedlbauer. His solution: "Annotate your data model, build a data dictionary and note that one term is being used by different departments to mean something else. That's the pragmatic approach. It probably will cause problems, but they are the kinds of problems that can be tolerated because you have them written down."

Patience Is a Virtue

RICH'S MODELING TEAM MEMBERS also had to grasp and articulate to their coworkers that designing a data model is a long, arduous process. "One of our biggest challenges was getting the commitment from our customers to be patient," says Brown. "Building a data model is an enormous amount of work and takes a lot of lead time. They're not going to see a deliverable for a good period of time. If we hadn't gotten that commitment, it never would have worked."

Perfection is a word that does not belong anywhere near the data modeling process. A data model should be constantly tweaked as IS learns from its mistakes and users offer additional feedback. ASU's student demographics data model, for example, changed 50 percent in the first year, says Rome. "The success of a warehousing project depends on your ability to accommodate those changes quickly. Our users don't care how they get their information as long as they get what they need."

If IS spends time building a data model that really reflects the way a company operates, it can't help but become more familiar with the business. And in the process of examining how data flows through the organization, inefficiencies are often revealed. "As you go through the process of modeling and determining business processes, you are obviously gaining insight into the company as a whole," says Schedlbauer. "At that stage, you have a wonderful opportunity to rethink the way you do certain things and make them integrated across all departments." **CIO**

Staff Writer Jennifer Bresnahan can be reached at jennifer@cio.com.

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TEAM PAYERS



*Teams are made up of individuals,
but should we pay them as such?*

*IS groups may respond better to
new group compensation schemes.*

BY DEREK SLATER

AT SATURN CORP., WHERE EMPLOYEES persistently refer to the entire company as a team, the symbol of successful teamwork is the Hostess Twinkie. The Spring Hill, Tenn., carmaker's president hands out Twinkies during meetings to reward exceptional team efforts. Last year, Saturn placed what it believes is the largest bulk order of Twinkies ever; each team leader in the company toured his

Reader ROI

IS MANAGERS LOOKING to motivate their teams will find examples and insights into the use of team-oriented compensation models, including the following:

- ▶ Pay-for-performance models
- ▶ Bonus plans
- ▶ Reviews based on team skills



*Team skills weigh heavily in IS employee performance reviews at GE appliances. The reviews include input from peers as well as the boss, CIO **Greg Levinsky** (bottom right).*

EMPLOYEE COMPENSATION

or her facility and presented every worker with a cellophane-wrapped reward to celebrate the launch of new models.

These days, there is a growing list of such attempts to motivate employees to hang together rather than separately. Twinkies are at the less orthodox end of the spectrum; more common strategies are plaudits in company newsletters or casual dress codes designed to eliminate status markers. While such efforts undoubtedly have their effect, some companies find that snack cakes and blue jeans alone will not whip everyone into a teamwork frenzy—particularly in information systems, which carries a bit of a reputation for not being at the forefront of team play. Many IS departments are finding that when it comes to motivating collaboration, the most applicable fundamental business aphorism is “money talks.” They’re rewarding teamwork by reworking salaries, bonus structures and performance evaluation criteria.

Teamwork as an important business weapon is not a new concept, but IS is playing catch-up in this area. Research by Meta Group Inc. of Westport, Conn., shows that while 80 percent of surveyed companies offer some incentive plan or bonus to IS workers individually, only 20 percent offer team incentive plans. In the opinion of Donald D. Tippet, a professor at the University of Alabama in Huntsville who has conducted extensive studies of corporate teamwork, IS is often the worst department in terms of managing and rewarding teams. “Typically, [managers] have espoused teamwork but singled out individuals for recognition, which destroys teamwork,” Tippet says. Jon R. Katzenbach, a director at Dallas-based consultancy McKinsey & Co., agrees: “IS distinguishes itself more for bad than for good.”

Exactly why this deficiency exists is subject to some debate. Tippet espouses one common theory: IS pros tend to rise to the top due to their technical skills, not people skills, and thus do not always exhibit a strong understanding of how to make teams work. Majid Naderkhani, CIO of Bell Atlantic Corp. in Arlington, Va., has a more forgiving explanation. He says IS departments are collections of workers serving a variety of clients with different goals and expectations, making a coordinated compensation method difficult to institute.



AT&T Universal Card's **Jim Venglarik** (foreground) believes in small rewards, rather than large bonuses, to reinforce the corporate expectation of good teamwork.

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Spreading the Wealth

WHATEVER THE REASONS FOR THE problem, IS organizations are in search of solutions. One of the simplest monetary strategies is to supplement the traditional compensation system—one based on meeting individual goals—with bonuses awarded for hitting group targets such as on-time delivery of a software development project. Federal Express Corp., for instance, has long provided incentive bonuses for achieving departmental or corporate objectives. In the past, these monetary rewards were given on an individual basis for outstanding effort or for contribution to company goals. Over time, FedEx has simply modified the awards so they can be given to entire teams. “I don’t think the original intent was to design something that would focus on team recognition, but we’ve done a good job of adapting what we have to reinforce teamwork,” says Julie Yancey, managing director of development services for FedEx in Memphis, Tenn.

AT&T Universal Card Services Corp. (UCS) also provides IS teams with cash bonuses—in amounts that don’t break the bank. “We have awards that are given to people at the team level, but the dollar amounts are not substantial,” says Jim Venglarik, vice president of systems development at UCS in Jacksonville, Fla. Instead, UCS relies more on its corporate

**“You can no longer just say,
‘Welcome to New England;
here’s what a programmer in
New England makes.’”**

—Julie Horkan Meringer

culture to support teamwork. In fact, Venglarik says large cash bonuses based on performance can send the wrong message—that teamwork is above and beyond the normal call of duty. “You ought to recognize people [for teamwork] so they know we value it but not give them something that’s extremely large, because teamwork is a basic expectation,” he says. The cultural emphasis on collaboration includes informal dress, open meetings and spontaneous interdivisional back-patting. According to Venglarik, it is not uncommon to find workers from UCS’s marketing group gathered around an IS employee’s cubicle (or vice-versa) to say thanks for help on a cross-functional project.

Paying for Performance

VENGLARIK NOTES THAT UCS HAS HAD an advantage in forging such a culture

because the credit card company was formed only six years ago. By that time, the strategic value of teamwork was quite clear to corporate America, so practices were outlined with teamwork in mind from the beginning.

Older companies may find it difficult to uproot legacy culture. To plant the team mind-set into these established businesses, a more radical team reward system known as pay-for-performance is emerging. It works like this: Instead of tacking a bonus onto employees’ regular paychecks, the pay-for-performance model places a percentage of the workers’ base salary at risk. Teams have an established set of project goals. Meet the goals, and everyone on the team shares in the financial rewards. Miss the goals, and all members take a hit together. For IS, these goals are typically deadlines and quality standards for delivering new applications and systems projects. Some IS organizations base as little as 5 percent of pay on project results; others ratchet that number to as high as 50 percent.

“You can no longer just say, ‘Welcome to New England; here’s what a programmer in New England makes,’” says Julie Horkan Meringer, an analyst for leadership strategies at Forrester Research Inc. in Cambridge, Mass. “Companies that are moving away from such bureaucratic pay points are being more productive.” Forrester has con-

HR: With Us or Against Us

Winning human resources’ support for unorthodox team compensation plans requires finesse

THE HUMAN RESOURCES department can be friend or foe when determining the compensation of IS teams. At some companies, HR may be ahead of IS in its thinking. At others, the CIO may face the challenge of bringing in a team-based compensation plan that the rest of the company hasn’t embraced.

At Bell Atlantic Corp. in Arlington, Va., the performance-based pay plan for employees assigned to the ExpressTrak ordering and billing system project was a big departure from the standard compensation policy. “There was some push and push back at first because HR people didn’t fully under-

stand what we were trying to accomplish,” says CIO Majid Naderkhani. Once Naderkhani and the rest of project’s steering committee clarified the project’s scope and crucial nature—largely through persistence—the HR department approved the plan and actually took the lead in communicating the details to upper management and IS employees. “They held cascading meetings, from management on down,” says Naderkhani. Now the company holds a weekly meeting open to all strictly to discuss the project’s status and answer employee questions.

A similar deviation from the corporate norm took place at GE Appliances in Louisville, Ky., where IS workers’ annual reviews now are based solely on the criteria of team and customer-service skills. CIO Greg Levinsky, who installed a similar IS model in two other organizations before landing at GE, says human resources has been receptive to the plan. By consistently declaring that IS is a service organization, Levinsky cleared the path to use whatever IS compensation methods will lead to enhanced internal customer satisfaction.

—D. Slater

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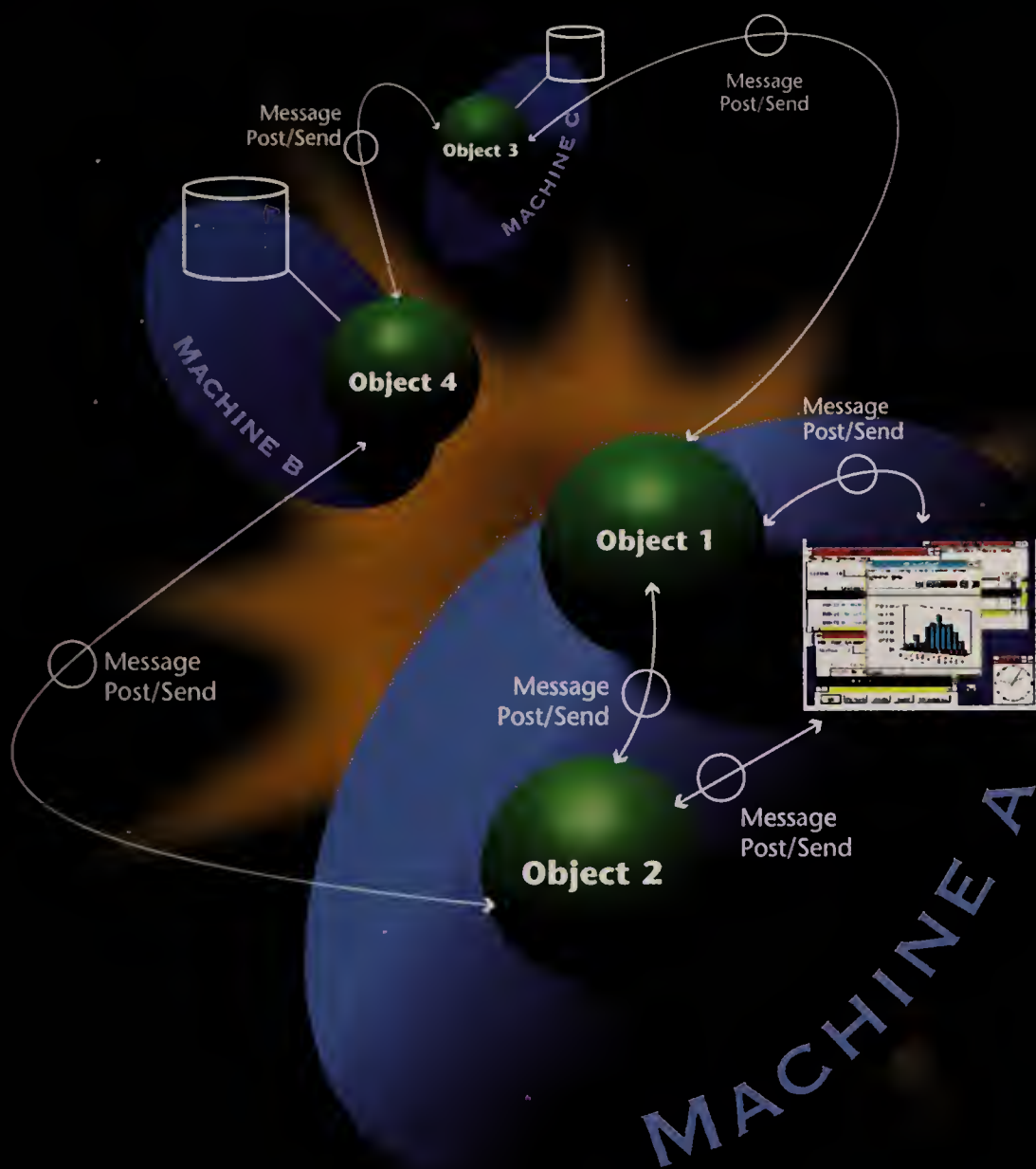
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At Bell Atlantic, employees—including CIO **Majid Naderkhani** (left) and process owner **Jeffrey S. McDermott**—tie their performance incentive pay to meeting team project goals.

structed a compensation model for inducing high performance in the IS organization and recommends that a minimum of 20 to 30 percent of employees' pay (in the form of bonuses) be linked to specific performance goals.

Bell Atlantic has adopted a performance-based model for all the full-time principal players in a major ongoing reengineering and software development effort called ExpressTrak. The project seeks to rework the utility company's ordering and billing system for a new client/server architecture. All management-level full-time employees involved in the project—including CIO Naderkhani and process owner Jeff McDermott—tie their performance incentive pay to meeting project goals. By exceeding team goals, the employees can earn more than 100 percent of their salary, as they did in 1995, when all affected

"Teamwork sometimes means you have to carry your partner on your shoulders across the finish line."

—Majid Naderkhani

workers earned 175 percent of the amount that was at risk. On the flip side, hitting less than 90 percent of the goals will erode the at-risk sum. "Everybody wins or loses," says Naderkhani. "If you succeed, you are rewarded tremendously. If you fail, you are punished tremendously." The team sinks or swims together, so there is plenty of incentive

to work together to meet and exceed corporate objectives.

While Bell Atlantic's plan may sound extreme, Meringer says the pay-for-performance method is ineffective if you deal only in small numbers. Forrester's interviews with CIOs and HR personnel using that compensation method also show that smaller risks and rewards simply do not produce the desired gains in productivity. However, one potential snag in the all-or-nothing group reward model is the problem of what to do with underperforming workers. Is it fair to award them a bonus based on the labors of those who took up the slack, allowing the indolent to ride others' coattails to glory? Generally, the answer is no. The simplest solution is for management to remove those who are weighing down the team's efforts. But poor performers get weeded out eventually one way or

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another. "A true team is a self-disciplining unit; those putting their feet up on the desk will be thrown off or worked around," says McKinsey's Katzenbach. He tells the story of a 17-member group at a large natural-gas company. Two workers on the team were "just not with it," he says.

"So the others simply designed a working approach that excluded those two and re-formed the team without them." Based on feedback from project personnel, Bell Atlantic is adjusting the compensation policy for next year. Workers on a given team will have more power to withhold part of the group's bonus from an individual member. Even so, "teamwork sometimes means you have to carry your partner on your shoulders across the finish line," Naderkhani says. "Teamwork is hard; you have to be committed to it."

Bell Atlantic's ExpressTrak project illustrates another important principle in the pay-for-performance method: The compensation model needn't be "one size fits all." About half of the 600 people involved in the project in 1995 were on the pay-for-performance plan, specifically those who had high levels of responsibility for the project's design or results. Management interviewed workers at all levels prior to implementing the team compensation model and decided whom to include based on their feedback. Lower-level IS employees were less enthusiastic about participating in the plan because they felt they had less influence over the project's success. Also, adding a large number of entry-level staff members to the bonus plan could have strained the budget if they all had surpassed their goals. Forrester's study found that of the respondents who use a performance-based plan, 55 percent link compensation to performance for all IS personnel while 45 percent include only top-level executives.



The Team Review

GE APPLIANCES IN LOUISVILLE, KY., takes yet another approach to rewarding teamwork. The \$7 billion branch of General Electric Co. does not link a percentage of IS pay to meeting particular project goals. Instead, teamwork is one of only two criteria on which employees are evaluated in their annual reviews (the

responsibility depend on teamwork, which helps get the teamwork message across. "It becomes common knowledge that that's the way things work," says GE Appliances' CIO Greg Levinsky. Levinsky uses numerous nonmonetary incentives and activities to encourage cooperation as well. At least once each quarter, the department organizes a teamwork-oriented exercise "that forces teams that don't normally work together to get to know each other," Levinsky says. The events are partly social and partly educational, and include activities as diverse as golf, wine tastings and laser tag. GE Appliances also trains employees to give each other effective feedback.

Levinsky considered using a pay-for-performance plan to put the necessary premium on teamwork. The choice of compensation model boils down to a manager's personal preference, he says, though he adds that cash bonuses based on project performance can lose their motivational effectiveness after a while as employees come to regard them as an entitlements.

For companies seeking to improve teamwork, the choice of model is perhaps less important than the simple decision to end the status quo. "The biggest problem is very simply that most organizations are driven by individual incentives and accountability," says Katzenbach. "If you continue to pay people primarily as individuals, you are working in direct opposition to the goal." **CIO**

Staff Writer Derek Slater can be reached at dslater@cio.com.

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The American Productivity & Quality Center has a best practices database and has conducted studies on team-based rewards and recognition.

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"Measuring IT—Compensation," a Forrester Research Inc. study, is available through the firm's Leadership Strategies service.

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"Team Building and Project Management: How Are We Doing?" (*Project Management Journal*, December 1995) offers a summary of a team-building survey conducted by Donald D. Tippet and James F. Peters.

Keeping the Team Going by Deborah Harrington-Mackin (Amacom, 1996). Includes a helpful section on measuring the value of a team.

No More Teams! by Michael Schrage (Currency Doubleday, 1995). For a high-level look at collaborative work, few books are more thought-provoking than Schrage's, originally published as *Shared Minds*.

other is customer service). Each of GE Appliances' 450 IS professionals receive "360-degree reviews" (see "Full-Circle Scrutiny," *CIO*, Sept. 1, 1996) by at least 10 colleagues from IS and other departments that have worked with that person in project teams. The criteria for teamwork evaluation include leadership and communication skills and the ability to resolve conflict.

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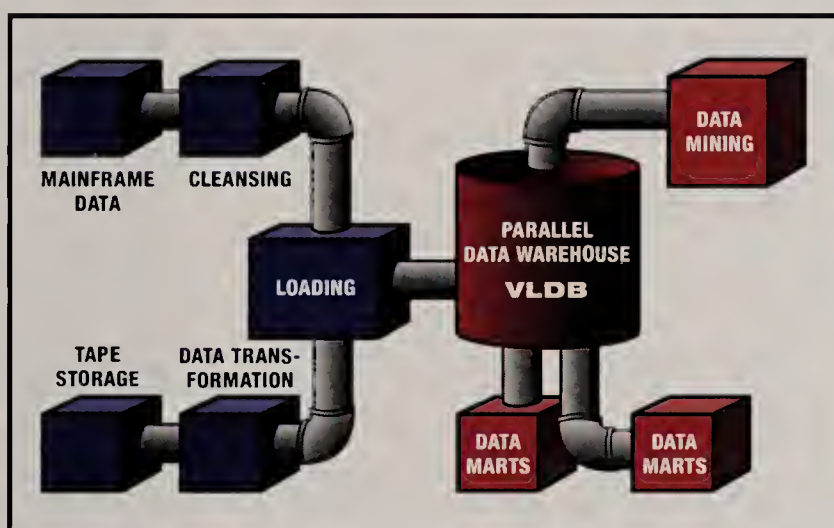
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Just thinkin' about tomorrow

MIT researchers look to the future to prepare business for the 21st century

BY RICHARD PASTORE

IT'S A WONDER Thomas W. Malone isn't mowed down by a bus. As he crosses congested Massachusetts Avenue, which winds through the heart of his MIT sanctum, he looks up at the Cambridge, Mass., thoroughfare's landmarks—BayBank's glass tower, Legal Seafood's tinted windows. But that's not what he sees. His head is somewhere in the 21st century, crowded with visions of companies as countries, megalopolises that not only provide jobs for 21st-century families but administer to such needs as insurance and banking. He also sees millions of tiny companies, some little more than one-person contractors, that connect and conduct commerce with each other via vast computer networks.

PHOTOGRAPHY BY WEBB CHAPPELL



Tom Malone:
*looking ahead
to designing
tomorrow's
organizations*

INTERVIEW: THOMAS MALONE

Malone, a professor of information systems and director of the Center for Coordination Science at MIT's Sloan School of Management, is one of the founding co-directors (with Professor Michael Scott Morton) of a major new MIT research initiative on the organizations of the 21st century. The project is dedicated to anticipating, understanding, inventing and exploiting novel ways people can work together in organizations of the 21st century, and to exploring how to design new organizations so that they can take advantage of information technology.

Malone and his colleagues believe companies that anticipate the coming changes and figure how to take advantage of them will have a critical competitive advantage over those that don't. Major companies are buying into that notion, at least on a just-in-case basis—MIT's initiative has the financial backing of such firms as British Telecom, EDS, Eli Lilly & Co. and National Westminster Bank PLC, not to mention the support of more than 60 MIT faculty members and researchers. We recently spoke with Malone about the project's applications for organizations and implications for their CIOs.

CIO: To some people, any futuristic research smacks of ivory-tower pontificating. What are some of the real-world applications of your 21st-century initiative?

Malone: Let me give you examples from the individual projects we're doing.

Professor of International Management Donald Lessard is looking at managing knowledge in multinational organizations and at how large organizations can exploit knowledge generated throughout their organizations rather than just locally in the headquarters country.

Charles Fine, associate professor of management science, is working on the design of supply chains. He argues that the critical core competency of organizations of the future will be the ability to rapidly design and redesign not just a product but a whole supply chain.

Research Associate George Roth is focusing on ways an organization can systematically learn more effectively from its own experience by actively compiling histories of events, projects and other experiences in a way that encourages reflective learning.

And Professor of Management Lotte Bailyn focuses on work and family issues. Her early results suggest that companies will need to encourage employees to find better ways to meet both family and company needs. She tells the story of a company whose managers realized they weren't getting projects done on time because people spent most of their days in meetings and had to come in early and work late to get quiet time to do their tasks. And, of course, that cut into their family time. So the company agreed that a certain number of work hours, something like from 9 a.m. to 11

a.m., would be quiet-time hours, with no meetings scheduled and no interruptions.

What will CIOs be doing in the brave new organizations of the 21st century?

Our work highlights the importance of designing organizations in the first place to take advantage of the faster, cheaper and higher-quality processes that IT will make possible. So CIOs of the 21st century may be as much organization architects as systems or information architects. They'll help design organizations that look quite unconventional by today's standards. Those might look like VeriFone Inc., the kind of virtual company that has offices in many cities but no real physical headquarters. Its people live on the network. Or CIOs will design fundamental work systems such as Andersen Consulting's Lotus Notes knowledge bases that propagate best practices from previous client engagements.

The best CIOs will act as proactive organization designers; they won't just implement things

desired by CEOs or other managers but will help suggest possibilities for using new technologies.

What skills does an organization design leader need? Are CIOs up to the task?

If CIOs are to become organization architects, new sets of management skills and disciplines will become relevant. They will need to know not only technology and basic business issues but also organizational change, knowledge management, and organization structure and design, and how those relate to corporate strategy and mar-

kets. The more familiar CIOs are with those disciplines, the more effectively they will be able to work with other members of the team.

What should be on the CIO's 21st century prep list today?

First, of course, they've got to solve the year 2000 problem. Besides that, the obvious critical technologies include the Internet and intranets, electronic commerce and groupware. A more general point to focus on is flexibility and creative exploration. Change is occurring more rapidly all the time; organizations that try to figure it out once and for all are wrong. CIOs will need to look for infrastructures that are flexible and adaptable to the changing needs of the marketplace as well as people who can adapt through retraining. For example, suppose in five years that 50 percent of your company's sales will be conducted over the Internet. In some industries, that will probably happen. If you're unprepared to adapt to that, you're in trouble. **CIO**

Managing Editor Richard Pastore can be reached via e-mail at pastore@cio.com.



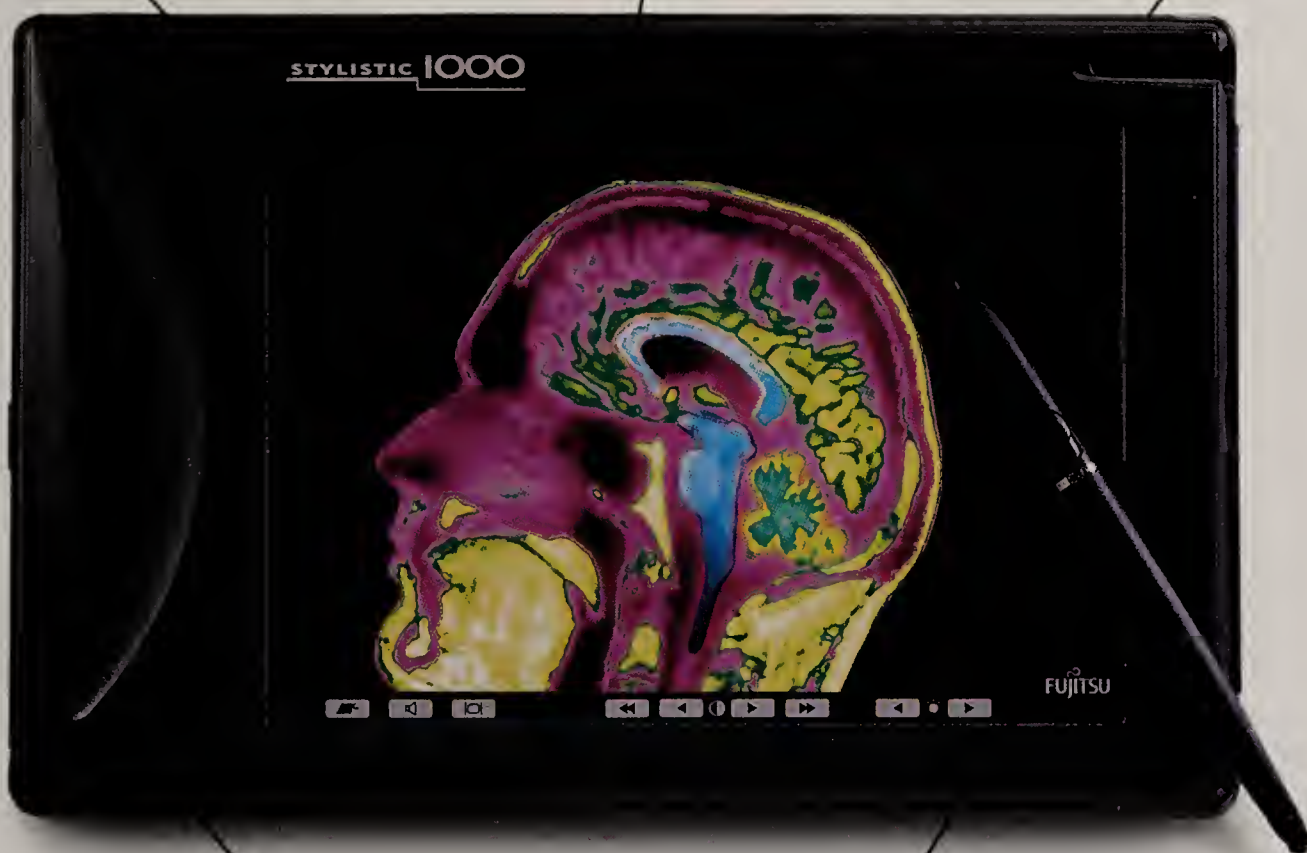
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LESSONS LEARNED FROM PEOPLE IN THE KNOW

The Lease You Can Do

Giving finance the lowdown on IS leasing can save the company money

BY JAMES M. JOHNSON

SUPPOSE A COMPANY, LET'S call it Moore Power Tuya Inc., needs to boost its data center's computing power with a new million-dollar mainframe. Because the company has more money available in its operating budget than in its capital budget, it decides to lease a system rather than buy one. So the IS department solicits proposals from lessors—among them equipment vendors, manufacturers and leasing com-

panies—and passes them on to the finance department. Finance considers each potential lessor's financial stability, reputation and cost of proposal, then decides which lessor to enlist. Despite finance's best efforts, IS feels like Moore Power ended up making the wrong choice.

Sound like a familiar pattern? When business functions are compartmentalized, companies risk making less-than-optimal decisions. The handoff

from IS to finance is no exception. But if IS properly defines from the beginning how a system will be used and how the lease will be affected, and clearly explains that information to finance, then finance will make the right decision when choosing a lessor—even in the eyes of IS.

Business As Usual

This is the process Moore Power follows in shopping for a mainframe to lease: The IS department solicits proposals and selects three serious contenders. Each bid is based on a 36-month lease with "payment in advance," which means the first payment is due at closing. IS submits the three leases to the finance group, which looks for the bid that will produce the lowest discounted present value of lease payments. (The discounted rate is what the company would have paid

if it had borrowed money to buy the mainframe and repaid the loan over a term equal to the lease term.) Finance decides to go with Low Rentals Ltd., the bidder that seems to be the least expensive.

Has finance used a valid analysis method? Yes. Has finance made the right decision? No.

So what is the problem? Finance usually analyzes information for the base case, a 36-month unaltered deal. But if such a scenario is not likely to unfold, then finance has found the right answer to the wrong question. In fact, it is very possible that the lease deal will *not* run unchanged for 36 months with the equipment being returned to the lessor at the end of the term, even though that was precisely the sce-



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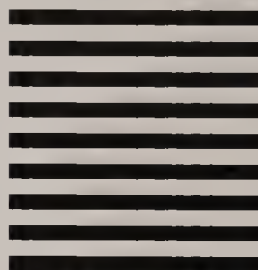
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nario finance used to make its choice.

High-tech deals frequently are altered before they expire for a number of reasons. For example, IS may need to terminate the lease early and migrate to newer technology or decide to modify or sublease the system during the lease term. IS also may want to purchase the equipment at the end of the lease term or try to extend the lease while waiting for a specific new technology to become available. As a result, the true lowest-cost lessor may well be different from the lowest base-case bidder. That is often the case if the bidders offer their own contracts rather than negotiate based on contracts prepared by the company signing the lease. If Low Rentals believed the lowest-rent bidder would win the Moore Power contract, it may simply have lowered the rent it offered Moore Power and increased the cost options mentioned elsewhere in the agreement to make up the difference. Its goal was to guess how Moore Power would make its decision; by correctly assuming that finance would go for the low-rent option, Low Rentals got the contract.

Setting the Scenarios

Moore Power's IS department couldn't have expected finance to anticipate the current and future business purposes of the mainframe to be leased. But IS could have improved the chances of getting a good deal by identifying the most likely scenarios for the 36-month base-case deal (such as early termination or possible renewal), negotiating of various options with lessors and then providing finance with the cost of each scenario before finance made its final decision. And IS could have calculated the total cost of each proposal according to 18-, 24- and 30-month terms as well as a 36-month term. That approach would have forced both IS and finance personnel to analyze more than one scenario. And besides, scenarios not accompanied by cost data are too easy for finance to ignore as unquantifiable.

Identifying a system's specific needs from the start also makes rights and options a higher negotiation priority to begin with and thus inspires rival lessors to offer more favorable terms on key issues. To figure out the importance of various lease flexibility options, IS should exam-

ine its company's own operating history. For example, when a major bank recently reviewed its mainframe financing history, paying particular attention to departures from contractual lease terms, it discovered that it had never gone full term on a mainframe lease. The bank had always terminated early or upgraded, and those can be expensive habits: If a company cuts out of a lease early but doesn't have prenegotiated terms for doing so, the company probably will wind up paying the lessor the balance of the contract. So the next time the bank decides to lease high-tech equipment, it will require bidders to include a termination schedule in their lease proposals.

Now what if Moore Power has a history of modifying or upgrading its mainframe equipment? That can be one of the most challenging scenarios. Adding

to an existing unit is relatively easy; migrating from one system to another during a lease term is much more difficult—and expensive. Companies that upgrade can use only their best efforts to forecast the cost of doing so. Negotiating with potential lessors upfront to get well-defined rights can help. Ideally, the lessee should be allowed to upgrade with any equipment vendor or lessor without the permission of the incumbent lessor and without granting the incumbent lessor the right to match other upgrade offers.

The company also should have the right to sublease without getting permission from the lessor (though the lessor must be notified), even if it's for the same rent the original lessor is charging. If the cost of terminating the lease—the “termination value”—seems relatively steep, substituting sublease rights may be a less expensive solution. So if history shows that Moore Power is likely to exercise that option (even if it's only within the company itself), IS should try to figure out when that might happen and what the sublease rent will be. If the right to sublease is not in a lessor's contract or requires the lessor's permission, Moore Power might save money by substituting a termination value.

Another factor IS should have con-

sidered in determining appropriate scenarios to evaluate is whether Moore Power usually buys its mainframe equipment when a lease expires. The cost of purchasing equipment at that point varies from lessor to lessor. Some will resist giving any price other than the fair market value determined when the lease is up, while others can be persuaded to give an upfront fixed-price purchase option based on a forecast of the mainframe's value when the lease expires. And some may agree to sell the equipment for whichever ends up being the lower price of the two.

If Moore Power had a record of extending leases for the type of mainframe it wants for six to 12 months beyond the initial term, IS could have negotiated fixed renewal rates as part of the original deal. If renewal rates are not prene-

The true lowest-cost lessor may well be different from the lowest base-case bidder.

gotiated, they likely will be equal to or greater than the base term rent. In either case, IS should give the fixed or forecast renewal rate to finance along with an assessment of the probability that the option will be exercised. (That assessment can be explained in terms as simple as “high,” “low” or “medium.”)

When IS communicates critical information about high-tech leasing options to finance, the two groups can make more economical decisions for the company without necessarily having to learn more about each other's function. So the next time Moore Power decides to lease mainframe equipment, the IS department should analyze the possible leasing scenarios and clearly present those options to finance, thus steering them away from the Low Rentals of the world. And by using the scenario approach, IS will earn the rare opportunity to reverse roles and finally tell finance how to save a dime or two. 

James M. Johnson is a finance professor in the Graduate School of Business at Northern Illinois University in DeKalb. He wrote the leasing industry's standard text, Fundamentals of Finance for Equipment Lessors (Equipment Leasing Association of America, 1990).

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Edited by Elaine M. Cummings

Global Positioning Systems

PCMCIA cards are transforming GPS into an everyday business tool

BY JOHN EDWARDS

WHAT CAN YOU DO WITH global positioning system (GPS) technology? Until recently, the answers to that question were clustered at both ends of the user spectrum: Either create top-secret, obscure uses for the military or make really cool gadgets and gizmos for consumers. Not many businesses (or CIOs) saw real value or applications in GPS for running a company. But all that's changing. New developments are helping transform GPS from a military strategy or high-tech toy into an everyday business tool.

GPS technology can help organizations that need to find precise locations, track assets or move people or vehicles. For instance, a shipping company can locate packages while they are in transit and relay the information to customers. Companies with truck or car fleets can track those vehicles to improve safety and productivity. And surveying, mapping, mining and construction companies are also beginning to use GPS. "The technology

is applicable to any activity in which you need to locate an exact position on the ground or a vehicle in motion," says Thomas Brizendine, an aerospace industry analyst specializing in GPS and remote sensing at market researcher Frost & Sullivan in Mountain View, Calif.

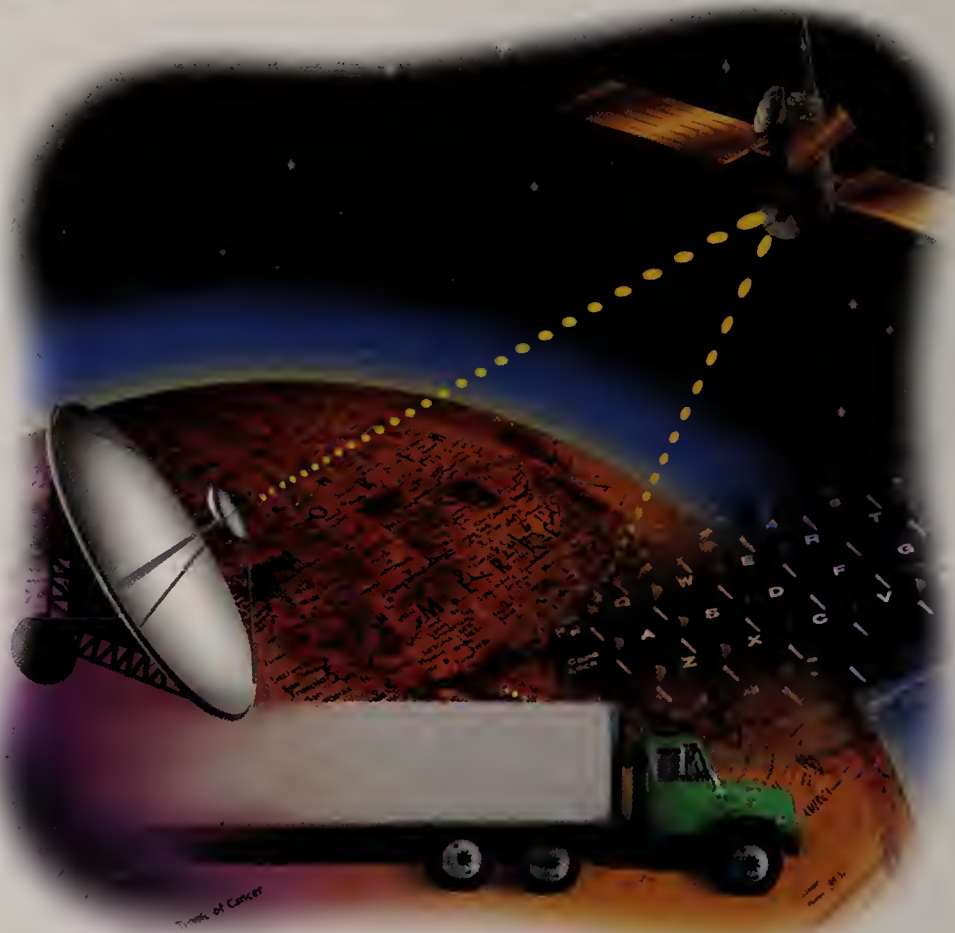
GPS technology has been fully operational since 1995, when the U.S. government launched the last

of 24 positioning satellites into an orbiting constellation. Because a GPS receiver can "see" at least several satellites in the sky at any time from any point on earth, in seconds the receiver usually can pinpoint a user's position to within a few feet. But until recently, most GPS receivers were handheld devices that spewed out positioning data that was difficult to interpret.

Now, with the arrival of GPS PCMCIA cards that plug into virtually any notebook or tablet computer, the technology is rapidly entering the business mainstream. Satellite positioning technology is destined to hit its stride within the next few years, according to Brizendine. "GPS hasn't fulfilled the commercial potential that many predicted for it a few years ago," he says. "But things are moving quickly now, and it will be only a matter of time before GPS becomes widely used for a variety of vehicle position-locating and logistics applications."

Location, Location, Location

Organizations most often use GPS to help workers find their way within a specific geographic area, says Steven Peskaitis, president of Chicago Map Corp., a developer and manufacturer of mapping software for consumer and business applications in Lemont, Ill. "Companies lose a lot of time to workers who get lost," he says. "Delivery drivers, sales representatives and other mobile



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workers who are unable to find their destination aren't productive. Being able to see their position on a map in relation to a destination can save users a significant amount of time and can easily justify the relatively low cost of a GPS receiver and mapping software."

GPS can also help organizations effectively manage fleets of trucks, cars and other vehicles. Linking a vehicle-mounted GPS receiver into a data or cellular network enables information to be transmitted back to a central location for real-time display on a dispatcher's computer screen, allowing dispatchers to reroute drivers when necessary. "The technology can also be used to ensure that workers are really where they are supposed to be and not catching a nap alongside the road," Peskaitis says.

GPS tracking systems also can monitor mobile objects other than trucks and cars. "Tracking containers, boxcars and truck trailers is the next area into which GPS technology is headed," Brizendine says. "Organizations can keep track of their mobile assets no matter where they are." GPS hardware may also be added to certain types of shipping palettes within a few years once the price goes down.

Items that are not mobile also can be tracked with GPS. Trimble Navigation Ltd. of Sunnyvale, Calif., for example, offers TargetStructures, a GPS-driven software product designed for precise monitoring of large mobile structures or platforms. The Windows program can be used to ensure the stability of bridge trusses, submerged tunnel sections or marine-based pile driving or drilling. "There's really no practical limitation to GPS," says Mack Schwing, global networking director at Deloitte & Touche Consulting Group in San Francisco. "GPS can be used to locate or follow any object, no matter how large or small."

Real-time position tracking is often described as an "active" GPS application. But GPS can also track the movement of items in a "passive" mode that doesn't happen in real time.

Like most GPS tools, passive tracking was developed as a military application. The technology is now gradually making its way into the private sector, often via government-sponsored technology

A Chilling Effect

Customer service records leave microfiche for laser discs

AT LAST, THE COMPUTER industry has produced an acronym you can actually remember: COLD, for Computer Output to Laser Disc, a cost-effective method for archiving hard copy reports. COLD's primary advantage is that customers or employees can retrieve documents such as sales reports or billing statements online—and in their original format instead of as incomprehensible lines of transaction records.

To understand a practical application of COLD technology, try this experiment: Call the local phone

company and tell them you need a copy of your bill from September 1993. See how long it takes to get that information—if you can get it at all. Most businesses that retain that type of information store it

as raw data or on microfiche, which means the lucky service representative handling your request is in for a long offline search and a bad case of eye strain. A COLD system, on the other hand, typically lets the service rep pull up the bill in its original format within a matter of minutes. Even better, combine COLD storage with Web access, and consumers can look up historical account records for themselves.

The key to strong COLD technology lies less in the physical storage device than in the software that indexes the millions of stored docu-

ments. COLD can handle internal reports such as general ledger, inventory, and shipping and receiving documents; however, customer service is the most important application driving the technology's growth.

COLD STORAGE

"IS hasn't had to think about documents before," says Mason Grigsby, a partner at Imerge Consulting based in San Francisco who is credited by some as the founding father of COLD. "Now they're going to have to be a part of the customer service

wave on the Internet, so there's a whole education process for CIOs." At this point, market share is divided among a great many players. Grigsby says the future belongs to the companies that can develop universal browser technology to view

not only COLD documents but also records stored in ASCII, Postscript and other formats in document management and imaging systems. That will probably require a vendor with deep pockets, such as FileNet Corp., which within the past several years has purchased vendors of each type of technology and is now at work integrating them. Other COLD players include IBM Corp., Wang Laboratories Inc., Mobius Management Systems Inc. of New Rochelle, N.Y., and Reading, Mass.-based TASC Inc.

—Derek Slater



transfer programs. One company that's taking advantage of government-developed GPS technology is Control Trac Inc., a small Aiken, S.C., manufacturer of passive tracking systems. Fred Wright,

Control Trac's president, describes his company's Sidekick unit as a "flight-data recorder for ground-based vehicles."

Sidekick, originally developed by the U.S. Department of Energy for use in



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Emerging Technology

government vehicles, can be used to monitor a car or truck's position and speed on a continuing basis. Wright says the technology has a variety of applications. "It lets companies know what happened to their vehicles while they were out on the road. It's a way of ensuring that operators meet their schedules and don't wander off to places they're not supposed to be." The technology can also be used to back up a driver's log book in the event of an accident, missed delivery or other incident.

"PCMCIA cards will make GPS an affordable technology that is evolutionary, not revolutionary."

—Mack Schwing

that will enable organizations to merge GPS data with customized maps and databases rather than just with just off-the-shelf mapping applications."

Taking a Position

A key factor in broadening the applications of satellite positioning for business will be GPS PCMCIA cards, Brizendine says. Produced by vendors such as Trimble Navigation and Centennial Technologies Inc., of Billerica, Mass., the easy-to-install cards cost between \$400 and \$700. The products also typically include portable antennas that can be mounted on a vehicle's dashboard or roof.

GPS PCMCIA cards enable organizations to adopt satellite positioning technology at a relatively modest cost, says Schwing. "The cards let users add GPS capabilities to the portable systems they already own," he explains. "That helps make GPS an affordable technology, something that's evolutionary rather than revolutionary. If a mobile worker is already using a portable computer, GPS can be added at a modest expense to help the individual work more efficiently."

The commercial rise of GPS is also due to state-of-the-art PC mapping applications that work with GPS PCMCIA cards to pinpoint the position of an individual, vehicle or other object on an on-screen map. A sizable array of GPS-compatible mapping applications is now available. The programs range in scope from relatively superficial products that show a vehicle's general position on a non-detailed highway map to sophisticated applications that can

Brizendine says GPS mapping and tracking applications are still only in their infancy. "A confluence of technologies is just beginning," he says. "GPS technology over the next two years will begin to work closely with logistics management tools and geographic information systems. We will see a whole range of products

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IN A TIME WHEN EVEN MICROWAVE OVENS and fax machines don't seem to work quickly enough, most people have little patience for delay. Even if it's a little old lady holding up traffic, they honk. And when they want information from the Internet, they want it *now*, not in a minute or two.

Connectware Inc.'s hardware/software solution, **PhoneWorks ISDN**, is the solution for busy workers. PhoneWorks ISDN upgrades a user's desktop PC or laptop to ISDN speed. A regular wall jack is all that's needed to enable the user's computer to download huge graphics, audio and video files in a flash.

Available in six configurations, PhoneWorks ISDN provides a complete telecommunications package. Product features include facsimile and voice communications as well as Internet access, conferencing capabilities and intelligent call control. The PhoneWorks ISDN ToGo module uses a single line to screen incoming calls and provide Caller ID on one channel, while the user is reaching across the Internet on the other channel.

In addition, PhoneWorks ISDN includes Connectware's "800" online install and registration service, a Windows-based dialer and directory and a headset and boom mike to allow the user to take full advantage of the ISDN digital voice clarity. Prices range from \$239 for an external connection with ISDN to \$619 for a PC card/ISDN with 28.8 fax/data/voice capability. Call 800 357-0852 or send e-mail to virtual@connectware.com for more information.



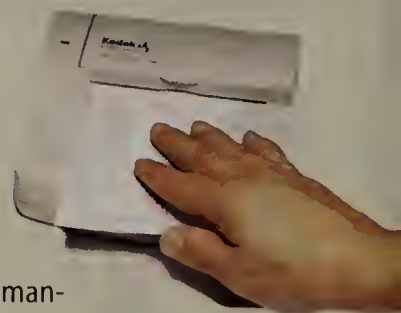
Scan Artists

SCANNING PHOTOS HAS BECOME almost as easy as taking them. Eastman Kodak Co. has released the **Snapshot Photo Scanner 1**, a color-photo print scanner with the ability to scan and display a picture—from magazine-page to baseball-card size—in less than 30 seconds.

The scanner works with all standard "snapshot" print sizes, including new Advanced Photo System reprints. Kodak's software works with several design applications, such as Adobe Systems Inc.'s PhotoDeluxe and PageMaker, Microsoft Corp.'s Publish and Corel's CorelDraw. The package also comes with PictureWorks Technology Inc.'s Photo Enhancer special edition.

"The Snapshot Photo Scanner 1 allows anyone—even first time PC users—to share their pictures as easily as they type a letter or send e-mail," says Janet Anderson, product line manager for scanners at Kodak.

The compact scanner, which weighs just under two pounds, captures pictures at a resolution of 600 dots per inch and can input pictures a maximum of four inches wide by 11.5 inches long. A full 24-bit color, 4-inch by 6-inch print, for example, occupies 2.75MB. System requirements



Five Ways to Make the Most Out of Turning 2000



As a business leader, you're accustomed to anticipating and preparing for the future. You're well aware of the "year2000 problem," and you're looking into ways to solve it. That's why you should know about Trans2000.

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Emerging Technology

pinpoint a vehicle's location at a specific address. Companies such as Chicago Map, DeLorme Mapping of Freeport, Me., and Digital Wisdom Inc. in Tappahannock, Va., offer a series of programs that show every street in the United States.

There's a GPS mapping tool to meet the direction-finding needs of almost any organization, says David Broad, Digital Wisdom's president. "Companies that operate nationally will need to acquire a library of several mapping products to meet their specific needs. A company

"Companies that operate nationally will need to acquire a library of several mapping products."

—David Broad

with operations in a single city or region will usually be able to rely on a single [software] product."

Although GPS is a potentially powerful business tool, it still has shortcomings, particularly in the area of position accuracy. Despite the best efforts of GPS hardware and software vendors, GPS-driven mapping applications remain prone to positioning inaccuracies that can range from 50 to 100 feet. Factors that can adversely affect measurements include variations in the earth's atmosphere, GPS satellite signals reflecting off buildings and other objects, and slight differences in satellite and receiver clocks.

While the technology is more accurate than ever, thanks in large part to the government's decision to phase out the intentional 300-foot "sloper" (a term that refers to the deliberate imprecision imposed by the government to prevent commercial users from developing more accurate GPS technology than the military), precision flaws can still affect the technology's usefulness. While fudging a few dozen feet isn't a big deal if one is navigating an oil tanker across the North Atlantic, an imprecise reading can give serious heartburn to a truck driver who's trying to find a street address in the catacombs of lower Manhattan or downtown Los Angeles.

Schwing says positioning accuracy can be enhanced significantly with sophisticated mathematical and modeling routines. Many GPS vendors also im-

prove accuracy in geographically dense areas by offering "signal blending" technology—mixing the signal of a known terrestrial radio source, such as an FM broadcast station, with the GPS signal. "On the whole, GPS accuracy is really quite good," he says. "For most users, any lack of accuracy is a problem that can be recognized and dealt with."

But another GPS problem—and one that's tougher to deal with—is fickle signal reception. While a GPS receiver should, theoretically, be able to "see"

several satellites at any given time, buildings, bridges and other large structures can effectively block GPS signals. Even dense foliage has been known to obstruct satellite reception. As a result, as a truck finds its way through a big city, its receiver may be invisible to all or most of the available satellites. The consequence can be painfully slow position updates or no updates at all. "That drawback is something a company would want to take into consideration before implementing GPS," says Schwing. "You want to know where blackouts are likely to occur and develop some way of dealing with them."

Despite the lingering problems, GPS seems destined to play a role at many organizations. Frost & Sullivan's Brizendine, for one, sees a bright future for the technology. "As costs continue to fall and more hardware and applications become available, GPS should continue to gain momentum," he says. "GPS has already made impressive strides for a technology that has only been available for a few years."

In fact, Brizendine predicts that GPS sales, shipments and adopters should "increase impressively" in the years ahead. "One could say that the 'sky is the limit,'" he quips. 

John Edwards is a freelance technology writer based in Mount Laurel, N.J. He can be reached via his Web page at members.aol.com/EdWords/top.html.

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Here's Looking At You

COMPANIES ARE SPRINGING up every day to develop new technologies that can be implemented on the Web. One such startup is Olivr Corp., a Lexington, Mass.-based firm founded in 1995 that takes its name from "online interactive virtual reality." As the handle suggests, Olivr is in the business of providing multimedia and interactivity tools for the Web.

The company's suite of tools allows developers to produce streamed, 3-D "photorealistic" movies using the Web by digitizing photographs rather than creating computer-generated simulations. Through its patented compression technology, Olivr aims to sidestep the Web's backlog, even in the narrow-band arena of 14.4 modems.

The **Olivr Production Toolkit** lets developers create images and stitch them together for a 3-D effect. In addition, developers can incorporate other media, such as audio and video, and link to other Web pages. The toolkit sells for \$495, runs on Microsoft Windows and NT as well as Macintosh and requires a 486 machine or better and 16MB of RAM. Other products include the Olivr Viewer, available free of charge for accessing Olivr movies, and the Olivr Server, with prices starting at \$2,500. More information and free downloads are available at www.olivr.com.

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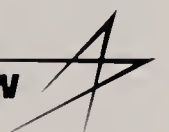
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APPLICATION FORM



The 1998 CIO Enterprise Value Awards

*Honoring Business Achievement Through The
Innovative Use of Information Technology*

APPLICATION DEADLINE: JULY 1, 1997

Presented By:
CIO Communications, Inc.



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Achievement
Through The
Innovative
Use Of
Information
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The 1998 Enterprise Value AwardsSM

CRITERIA

A panel of independent judges will choose winners from among entrants who have submitted completed application forms to *CIO* by July 1, 1997.

Entries will be judged on the following criteria:

- The extent to which the system adds business value in furthering the organization's strategic or operational objectives
- The measurable financial return the system provides to the organization
- The extent to which IT was key in achieving the overall business solution—the “couldn't have done it without technology” factor
- The quality of collaboration between the business unit and IS organization that is achieved throughout the course of the project

Each finalist will be subject to an in-depth analysis of the nominated system (to be performed by *CIO* or its agents). That analysis, which may require a site visit, will be based on interviews with sponsoring executives and system users and will be designed to substantiate all claimed benefits. Notification of winners will occur in October 1997. *CIO* reserves the right to publish relevant cost and savings figures that establish the claimed ROI of the system; the willingness to divulge that information for publication is a condition of entry.

DEFINING VALUE

We invite applicants to consider the broadest possible spectrum of enterprise value. The following list of IT-enabled benefits is intended to help guide applicants' thinking:

- new, innovative and more productive ways of doing business
- revamped organizational structures or styles of performing the work of the enterprise
- the ability of the enterprise to enter a new market
- successful global operation or expansion
- transformation of the way the enterprise competes within its customary market or of the terms of competition within the market

- improvement of the enterprise's relationships with its external customers
- improvement of the enterprise's relationships with its own employees or among its functions (such as marketing, finance or human resources)
- the ability of the enterprise to compete more effectively by adding to the sum of its available knowledge assets
- leaner and more economical operations

ENTRY GUIDELINES

- The system must have been operational prior to July 1, 1995.
- Entrants must agree to be featured, along with their systems and organizations, in a *CIO* article.
- Entries must be complete.
- The application form may be reproduced.
- Multiple entries from one company will be considered, but each entry must be submitted separately.
- Entries must be made jointly by the IS executive *and* the business sponsor for whom the system delivers value.
- IT vendors, public relations and advertising companies, consultants and other third parties may *not* apply on behalf of another company. They are encouraged to forward this form to the “owner” of the system or to contact *CIO* Communications to recommend that an application form be sent to the client.
- All entries must be computer-generated or typed; no handwritten entries will be accepted.
- Entries must be on 8.5-by-11-inch paper, one side per sheet.
- When feasible, an additional copy of the entry should be sent on a 3.5-inch disk. Electronic entries must be limited to word-processing and spreadsheet packages that are compatible with Microsoft Word and Microsoft Excel on a Windows or Macintosh platform.
- To view a complete sample application, or for more information on the Enterprise Value Awards, please visit our Web site at <http://www.cio.com/forums/EVA.html>.

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Enterprise Value Awards

THE VALUE OF IT. IT'S REAL. You know it, and you've proved it. Your organization is actually realizing business value and hard-dollar benefits from IT investments. And although the payback is its own reward, the *CIO* Enterprise Value Award will bring you, your company and your IT organization the industry recognition you all deserve!

POSITIONING IT AS A BUSINESS ASSET

Yet the *CIO* Enterprise Value Award goes beyond recognition. It is an opportunity to provide hard, tangible facts about business value and ROI from information technology to the business community at large. It is an opportunity to demonstrate how partnering between business and technology executives can lead to the attainment of strategic objectives. By communicating the payback, *CIO* hopes to encourage other businesses to invest wisely in IT to ensure their survival in a fiercely competitive global market.

DO YOU QUALIFY FOR AN ENTERPRISE VALUE AWARD?

Four criteria are essential.

1. A return of value to the enterprise
2. A measurable financial return attributable to the system
3. The pervasiveness of information technology — in other words, the strategic objective could not have been met without IT's contribution
4. A collaboration between an IT and business executive

CIO ENTERPRISE VALUE AWARDS TIMELINE

APPLICATION DUE: July 1, 1997

JUDGES SELECT WINNERS: October 1997

WINNERS ANNOUNCED: October 1997

AWARDS CEREMONY: February 1998
at the *CIO* Enterprise Value Retreat
Ritz-Carlton, Laguna Niguel, Calif.

*1996 winners from
United HealthCare Corp.*



IF YOUR INNOVATIVE SOLUTION meets the criteria, please complete this Enterprise Value Awards application form. The Feb. 1, 1998, issue of *CIO* will feature profiles of the winning organizations and the executives who have proved that their technology investments have had a positive and sustained impact on enterprise value.

IN FEBRUARY 1998, *CIO* will host a special awards ceremony honoring the Enterprise Value Award winners at the annual *CIO* Enterprise Value Retreat. For more information, please contact Lisa Kerber at (508) 935-4449.



1. COMPANY/BUSINESS UNIT

name of parent company

city, state where headquarters are located

publicly or privately held?

annual revenues

industry

name of business unit or organization

city, state where located

number of employees at business unit

URL

2. ENTRANTS

A.

name of entering IS executive / system sponsor

title

name of division, department or unit

address

city

state zip

telephone fax

e-mail

B.

name of entering business-unit executive / sponsor

title

name of division, department or unit

address

city

state zip

telephone fax

e-mail

3. SUPPORTERS

Please list four people who are willing to be interviewed with regard to the system, its development, its use and the value returned. At least one should be a member of the technology team that developed the system and should have played a significant role. At least one should be a primary user from the sponsoring business unit. The other two may be from either organization or represent suppliers, customers or others intimately familiar with the system.

A.

name

title

telephone fax

e-mail

reason for inclusion

B.

name

title

telephone fax

e-mail

reason for inclusion

C.

name

title

telephone fax

e-mail

reason for inclusion

D.

name

title

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reason for inclusion

DEADLINE: JULY 1, 1997

Mail to: Enterprise Value Awards • CIO Communications, Inc.
492 Old Connecticut Path • P.O. Box 9208 • Framingham, MA 01701-9208

4. THE NOMINATED ORGANIZATION

Please tell us about your organization (*company, business unit, agency*) in 500 words or less. Include information on:

- when the organization was founded
- mission statement
- major products and services
- markets served
- your organization's standing within its industry
- any other data you believe to be relevant in terms of general background

5. THE NOMINATED SYSTEM

Tell us about the nominated system and demonstrate its importance to your organization by completing the following sections. Please limit your material to one page.

System Description: In one sentence or less, describe the system or IT initiative you are nominating (e.g., order-entry or document-management system; switch to a client/server architecture; global network implementation).

Technical Profile: Briefly describe the technology of the nominated system. Please include the names of major vendors and products. (NOTE: The examples provided here are meant to be illustrative, not all-inclusive.)

- Architecture (e.g., *client/server, mainframe*)
- Hardware (e.g., *mainframe/parallel processor, mini-computer/server, PCs, handheld devices*)
- Software (e.g., *operating systems, database system, application software*)
- Software development tools (e.g., *CASE, 4GLs, GUI developers, object-oriented development tools*)
- Network/communications hardware, software and services (e.g., *modems, routers, e-mail packages, carriers and public networks*)

6. BUSINESS IMPACT

Describe the primary business objectives of and value delivered by the IT investment. Please limit this section to three pages.

Statement of Value: List the three most important contributions the system has made to the business (please refer to "Defining Value" section on the first page of the application form).

Business Value Description: In detail, describe how the system delivers the value identified above (please include supporting data). Also describe any added value delivered, whether intentionally sought or serendipitously encountered.

Scope and Impact: Identify the functions (e.g., customer service, manufacturing, planning) that were changed by the system, the nature of those changes and their impact on the business. Also indicate the system's uniqueness compared with solutions being deployed by other companies within your industry.

The Importance of IT: Identify the different components of the overall business change (e.g., business reengineering, downsizing, cycle times). Explain the importance of the IT component to the overall business change. Could the results have been achieved without IT?

Collaboration: Describe how the business unit and IS organization worked together throughout the project, from conceptualization to implementation. What were the specific tasks fulfilled by the business unit? The IS organization?

7. QUANTIFYING ROI

Provide a detailed, one-page summary of the nominated system's investment costs (including all upfront development expenses and annual maintenance charges). Also provide estimates of returns (including increased profits, reduced costs and indirect cost-avoidance). Estimates of costs and returns should be made per annum over a five-year period. This data is required to make it past the first round of judging. If your company is selected as a finalist, you will be required at that time to fill out a standardized table detailing specific costs and returns.

8. TRUTH OF INFORMATION/RELEASE

The following release must be signed by both nominating executives if the application is to be considered.

Unsigned releases will invalidate the entry.

I hereby state that the information provided is true and complete to the best of my knowledge and belief.

I authorize the release and use of, in connection with the Enterprise Value Awards program, any and all materials furnished by me or others at the company contacted for this judging. I understand that information submitted on this application or subsequently gathered during the evaluation and judging process may be used in articles or any other type of publicity relating to the Enterprise Value Awards program.

I also authorize the release and use of my name, my company's name and my likeness, including but not limited to any photographs and any recording of my voice or image that may be taken of me for CIO Magazine. I agree that no compensation shall be due me or my company for such usage.

I recognize that failure to meet these conditions or to provide sufficient material that can be published can cause the application to be rejected at any point in the process at the sole discretion of the sponsors.

1. _____
signature of nominating IS executive date
2. _____
signature of nominating business executive date

9. OTHER EDITORIAL OPPORTUNITIES

If you are not selected as an award recipient, are you willing to be contacted for inclusion in other articles in CIO Magazine?

☐ Yes ☐ No

How did you learn about the Enterprise Value Awards program?

- ☐ CIO Magazine ☐ Academician ☐ cio.com Web site
☐ Consultant ☐ IS staff member ☐ PR Agency
☐ Systems Integrator ☐ Other publications ☐ Other
☐ Vendor ☐ Advertising Agency (please identify)

CHECKLIST

Have you filled out...?

- ☐ Company/Business-Unit, Entrants and Supporters Information

Have you included on separate pages...?

- ☐ Nominated Organization
☐ Nominated System
☐ Business Impact
☐ Quantifying ROI

Have both entrants signed and dated...?

- ☐ Truth of Information/Release

Have you checked off...?

- ☐ Other Editorial Opportunities
☐ How you learned about the Enterprise Value Awards program?

CONGRATULATIONS TO THE 1997 WINNERS OF THE ENTERPRISE VALUE AWARDS

Bell Atlantic Corp.

GARY R. WEISENBORN

*Vice President—Information Systems
Business Systems*

BRUCE S. GORDON

*Group President
Consumer & Small Business Services*

The Chase Manhattan Corp.

DENIS O'LEARY

Executive Vice President & CIO

FRANK LOURENSO

*Executive Vice President
Middle Market Banking Group (MMBG)*

Fidelity Investments

ALBERT AIELLO

CIO

President, Fidelity Investments Systems Co.

STEVE AKIN

President

Fidelity Retail Customer Services

MacGregor Medical Association

JIM SLOANE

Director of Information Technology

LAURA B. COOK

Chief Quality Officer

Schlumberger Ltd.

DAVID P. SIMS

Technical Manager

VICTOR E. GRIJALVA

*Executive Vice President
Oilfield Services*

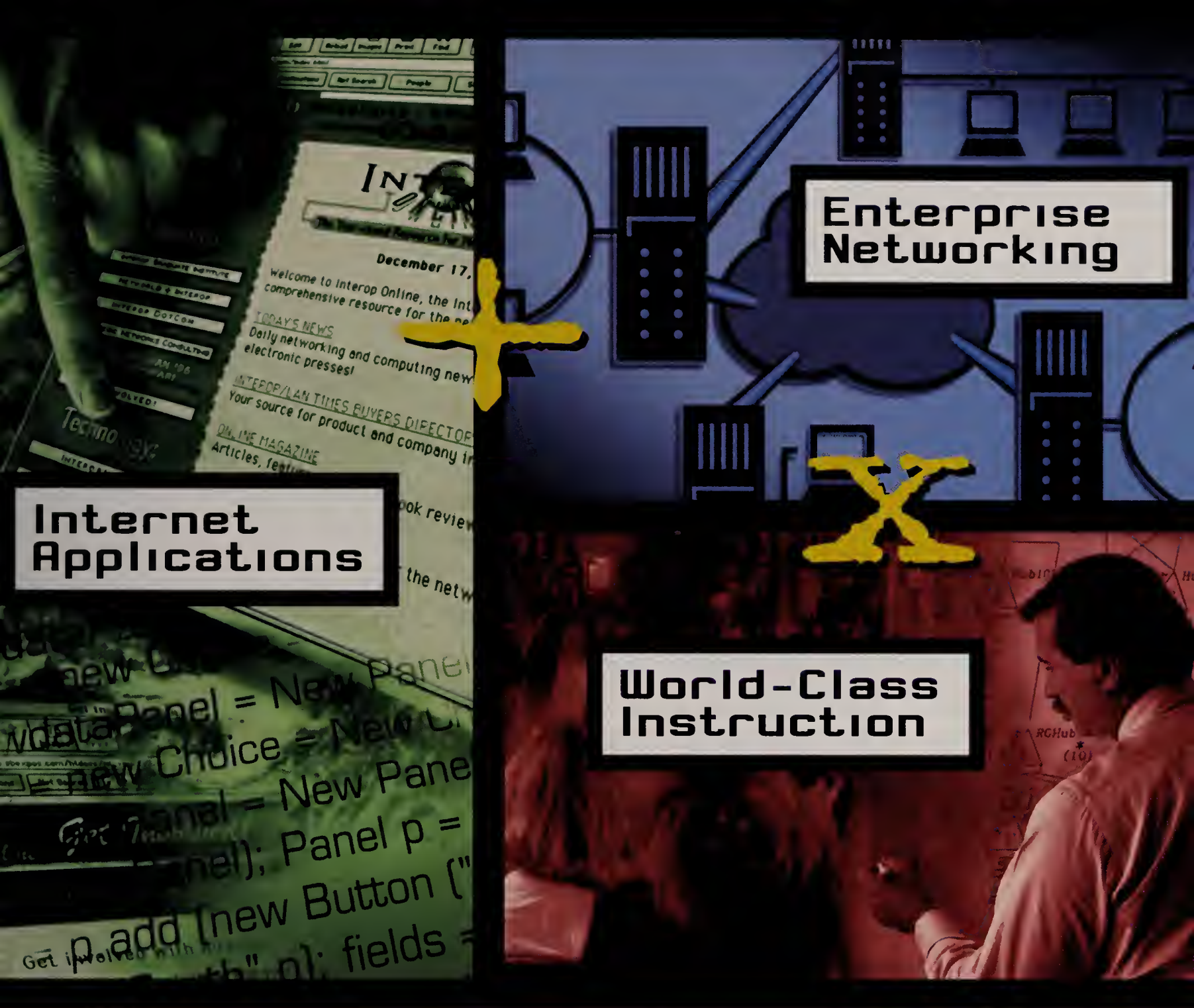
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ShopTalk

Aetna's Glen Salow on the CIO as Blue-Collar Worker

CIO: You've said CIOs should think of themselves as blue-collar workers. What do you mean?

Many have the view today that the CIO's most important role is as a corporate-level strategist. Certainly CIOs have an important strategic role. But many are beginning to lose track of what the key component of their job is. It's about delivery, stupid. The most important thing I do every day is to make sure our production systems run in a reliable and cost-effective fashion and that we deliver the new capabilities we've committed to as described. Only after that can I worry about the vision.

Well, it's hardly the conventional wisdom these days.

One of the reasons CIOs get away from that stuff is that nobody likes to be involved in a production problem. It's not the fun part of the job. And it's not easy to get your best managers to focus on production support. But, quite honestly, that's where you need them.

How do they get seduced?

We all want to feel we're at the top of the profession, and we all want to help our company discover the next competitive advantage. In the end, though, that's only



Spotlight On:

Glen Salow, CIO, Aetna Retirement Services, Hartford, Conn.

- **Line of Business** Financial services
- **Bio** Joined Aetna in 1992 as vice president of investment systems; became CIO of Aetna Retirement Services in 1996
- **Day to Day** Oversees all IT, supporting the company's more than 2 million customers
- **Challenges** Leading the execution of a five-year IT plan to allow flexible interaction with customers and distributors.

part of what we do.

People also want to see themselves as sexy. And the media is drawn to sexy things. But it's not sexy to talk about what a CIO can do on a hands-on basis. I can't remember the last time I read about the CIO's responsibilities in application or production delivery. For every article about the wired marketplace, I'd like to see one on how to optimize your existing legacy environment or how to take the lessons learned from your legacy environment and carry them forward. They aren't terribly sexy topics, but they're terribly important ones.

Can't you designate someone in your department to make the trains run on time?

If CIOs pull themselves away from the day-to-day activity, they're going to lose

technology to some degree. Staying close to them allows me to get their thoughts on practically applying new technology to current business problems. CIOs that step away from day-to-day support lose their chance to hear the clues coming in from the staff in the trenches.

So you have to strike a balance between the tactical and the strategic?

More important, you've got to establish a thought process where you're constantly thinking about both. Running in dual mode means

you've got to roll up your sleeves and be in there. You've got to always ask, "How am I dealing with this on a tactical level, and what is the implication of this at the strategic level?"

Dual mode?

Behind many of the wonderful business ideas that have been attributed to technology is a CIO who ran in dual mode. I don't think that American Airlines was expecting to create a whole new business when it developed its

Sabre system. It was trying to deal with a reservation problem, and somebody in dual mode said, "I can deal with the problem, but I can also move us forward."

So it's not exactly a blue collar that you wear?

You could say I wear a blue shirt with a white collar, or a blue-and-white striped shirt.

—Elaine M. Cummings

a huge amount of insight into what the future should be. Some think they can outsource their day-to-day operations, either outside the company or by designating part of the department to make sure the systems keep running. Meanwhile, they go off to do the new stuff. But they need to be close to the action. Every person in my department tracks new



October 12-15, 1997
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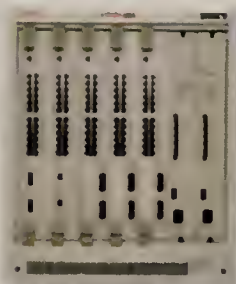
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